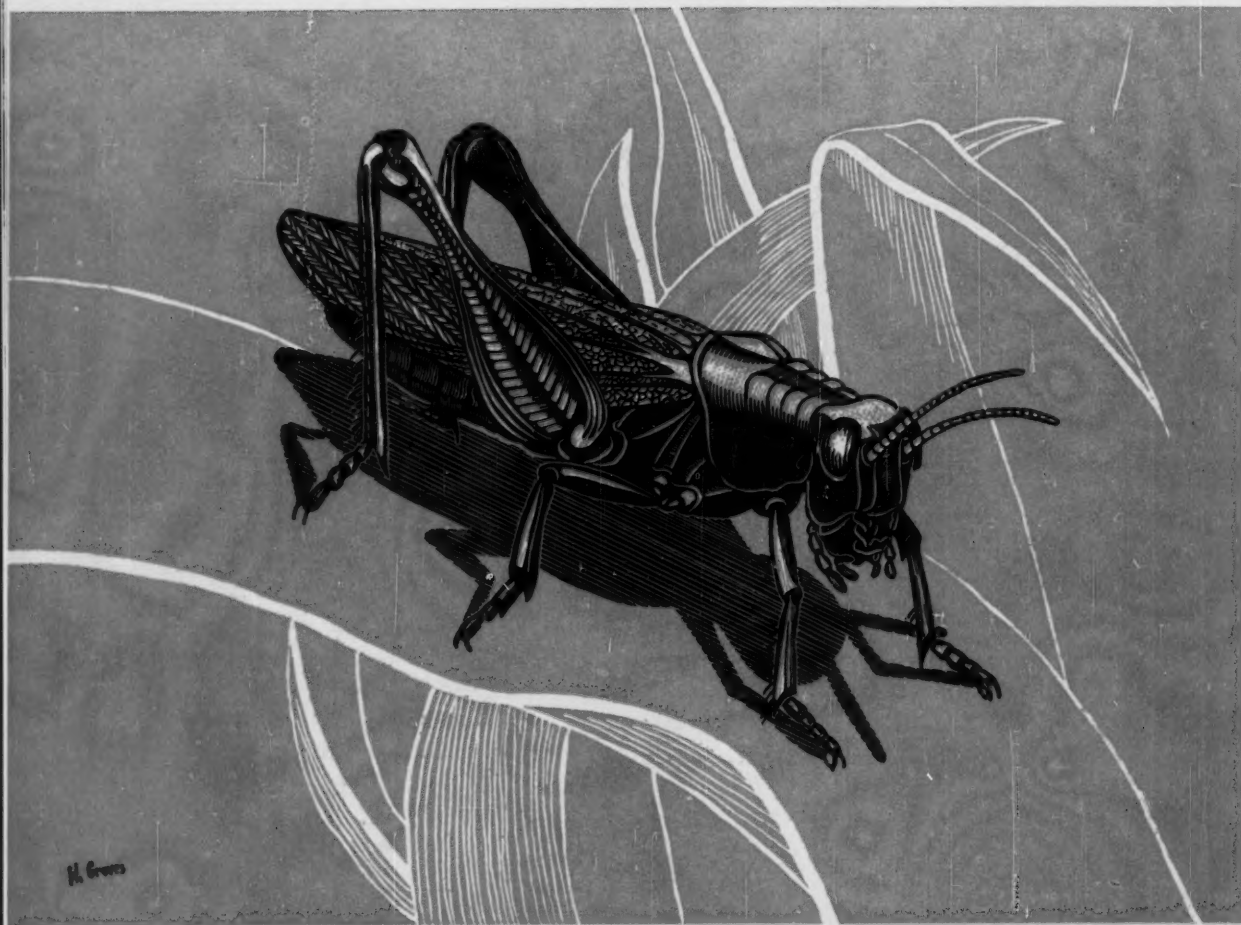


Nature *Magazine*

AUGUST-SEPTEMBER
1956

VOLUME 49 NUMBER 7

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The man who named Tombstone, Arizona



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Plants that Feed Us

By Carroll Lane Fenton and Herminie B. Kitchen. New York. 1956. John Day Company. 95 pages. Illustrated by Dr. Fenton. \$2.75.

We take the grains and vegetables that come to our tables pretty much for granted, usually without realizing the interesting stories that lie behind them. Yet the history of crops is an ancient one, and as fascinating as it is historic. In this popular treatment the authors cover grains and vegetables from artichokes to zucchini, treating with the history of these plants, their origin and introduction to other parts of the world, and the achievements of man in improving upon Nature through cross-breeding and naturalization.

Flowering-Plant Taxonomy

By J. Heslop-Harrison. Cambridge, Mass. 1956. Harvard University Press. 135 pages. \$1.25.

"All botanists must welcome this excellent account of the impact of experimental and other intensive studies on orthodox plant taxonomy," says Dr. W. B. Turrill of the Royal Botanical Gardens at Kew in a foreword to this little book. "Dr. Heslop-Harrison has clearly and very fairly summarized the results of a great deal of modern research in the border belts between taxonomy, ecology and cytogenetics. Those of us who have pioneered for modernization of plant taxonomy by extending its aims and methods, improving its descriptive matter, and enlarging its concepts will be encouraged both by this book and by the knowledge that the subject is attracting vigorous new recruits of the calibre of the author." Dr. Heslop-Harrison is Professor of Botany at The Queen's University of Belfast.

All You Need to Know about Dogs

By Hayes Blake Hoyt. New York. 1956. G. P. Putnam's Sons. 249 pages. Illustrated. \$4.00.

Using a questions and answers approach to her subject, the author instructs the reader on many facets of dog ownership, from the original acquisition of a canine pet to the showing of the dog. Training and health are given special attention, as are special problems, by this authority on dogs.

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Nature Magazine

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"The Perfuming Act"

Last winter I read a book on Nature called *Circle of the Seasons* by Edwin Way Teale. He had observed two robins at different times going through what is commonly known as "the anting rite." At another time he saw a bluejay going through a similar performance, and, at still another time, he saw five starlings in an anting performance.

I have seen the same "anting performance" by a timber squirrel. About three feet from the ground, on a large maple, he moved about quite strangely on the large trunk. He scratched the bark, bit into it, then rubbed his tummy up against the spot. Turning his head backward up against the spot, the squirrel seemed to enjoy rubbing himself all over, then climbed up the tree. Upon careful examination of the spot I found a small hole in the tree, where a branch once had been cut. Ants had started to work and sap was coming out to the bark. Who can say what brought about the strange behavior of this squirrel? Was it the presence of ants, or was he simply "perfuming" up a bit with maple juice?

The theory is that formic acid from the ant is instinctively used by birds as a repellent against body lice. Mr. Teale adds that birds have been observed to go through this "anting act," also employing a number of other strong or pungent materials, such as orange peel, walnut husks, cigar butts, and others.

We often see a dog (cat, too,) rolling over and over on a strong-smelling heap of fertilizer, or rolling over and over again on a smelly dead bird or mammal. Why do they do it? Perhaps these pungent and strong-smelling things are perfumes to both birds and mammals? Nevertheless, the performance is for some purpose. Call it "the anting act," if we will, but, "the perfuming act" might be a better name for it.

CARL H. SWANSON

Mourning Doves

In some States the mourning dove is a game bird; in others it is protected as a valuable song and insectivorous bird. There is strong feeling among many individuals that it should be everywhere protected, and that it is continued as a game bird only as a live target and not because it has any significance as food. Yet

open seasons continue to be declared by the Fish and Wildlife Service. A recent release of that Service admits that information about the migratory habits of the mourning dove provides "fragmentary data" and this falls "far short of management needs." This spring a "call count" on some 700 routes of the doves by some 600 individuals was held to provide data upon which hunting regulations would be based. This count calls for counters to be on the job a half-hour before sunrise, under specified weather conditions, and to cover a series of listening stations. Also this summer an intensive banding program by volunteer bird banders cooperating with the Service is being carried on. We have no hope that the data assembled will result in complete protection for the mourning dove, but it is to be hoped that the information will be fairly assayed without regard to the hunters' demands.

Refuge Visitors

Travelers over highways of the United States often see "the sign of the flying goose." This is the emblem of the National Wildlife Refuge system of the U.S. Fish and Wildlife Service and marks one of the areas in this system. During 1955 a record-breaking total of 6,974,447 people visited these refuges, an increase of 1,772,187 visitor-days above the 1954 figure. Sport fishing lured 2,677,452 visitors, and picnicking, swimming, boating, photography and Nature study were the principal categories into which the remainder were classified. Wichita Mountains Wildlife Refuge, in southwest Oklahoma, and Crab Orchard National Wildlife Refuge, in southern Illinois, were the most visited.

Danger Spots

Ten Dangerspots are designated in a recent folder prepared by Paul Shepard, Jr., chairman of the conservation committee of the National Council of State Garden Clubs and supplied to all member clubs. He lists these danger spots as chemicals—our daily poison; Indians—human conservation; soil—dust storms; water—increasing pollution; space—always room for one more?; woodlots—capital depreciation; national parks—invasion; wildlife refuges—target ranges?; vanishing species—protection needed; watersheds—whose responsibility?

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Nature IN PRINT

By HOWARD ZAHNISER

Beasts, Past and Present

ONE NEVER KNOWS just why this book or that engages the attention so closely at a particular time. Out of a group of newly published works before me, a few evenings before these lines were written, one seemed to demand immediate attention. The others on subsequent reading have proved to be of great interest, also, and must soon be discussed here, too. But Roger M. Latham's *Complete Book of the Wild Turkey* seemed to come first. It recalled, strangely enough, the Twelfth Century bestiary translated by T. H. White and published some time ago—read and laid aside then for future discussion. Entitled *The Book of Beasts*, this curious old volume lies here now beside the turkey book, one of the latest products of our up-to-date scientific wildlife management, and the two books are indeed interesting side by side.

Our Twelfth Century writers are quaint and perhaps amusing to us, but our editor, T. H. White, emphasizes that a bestiary is a serious work of natural history. It is "one of the bases upon which our own knowledge of biology is founded, however much we may have advanced since it was written."

So, balancing our amused condescension, remembering that a feeling of superiority over predecessors from whom we have profited is a vain indulgence, we can read this medieval work with interest and some appreciation. It has meaning in the history of man's literature and his interpretation of the universe, as well as in the history of his studies of the natural world.

Charm of a bestiary

Quick to see symbols, earnest to perceive the moral, and apparently delighted on their discovery, the bestiary writer has great charm for a sympathetic modern reader. Our editor first approached the medieval moralizations "in a spirit of boredom," but "their holy simplicity finally reached the heart." "Quite apart from the intellectual interest of the symbol," Mr. White sensed

"a gentleness of manner and a hopeful goodness which do touch the emotions." These qualities make a current reading pleasant as well as curious.

The bestiary writer was trying to encompass the available knowledge. He tells the lore of the "fenix": "When it notices that it is growing old, it builds itself a funeral pyre, after collecting some spice branches, and on this, turning its body toward the rays of the sun and flapping its wings, it sets fire to itself in its own accord until it burns itself up. Then verily, on the ninth day afterward, it rises from its own ashes!"

The nightingale story

Our writer also tells of the birds that he must have seen. A sample short account is of the nightingale:

"The Nightingale bird, LUCINA, takes this name because she is accustomed to herald the dawn of a new day with her song, as a lamp does (*Lucerna*).

"She is an ever-watchful guardian, too for she warms her eggs with a certain hollow of the body and with her breast. She tempers the sleepless labour of her long night's work by the sweetness of her song, and hence it is seen that the summit of her ambition is to cherish her young and to warm the eggs, to the best of her ability, not less by her sweet tones than by the heat of her body.

"In imitation of this bird, the poor but honest working woman, as she toils with her arm at the thumped grindstone so that a subsistence of bread may not be lacking for her babies, yet lightens the burden of poverty by her nightly song, and, however unable she may be to imitate the lovely measures of the nightingale, yet she does imitate it nevertheless by the diligence of her devotion."

There are sections of this bestiary devoted to "Beasts" and to "Reptiles and Fishes"—as well as the one devoted to "Birds"—and an "Appendix" contains the informative, interpretive discussion by the editor.

One might wish that the Twelfth Century bestiary writers could have

included the turkey. Then we might have compared their treatment with Roger M. Latham's handling of his *Complete Book of the Wild Turkey*. The trouble is, the turkey was not known to book writers until three centuries later. Not until Columbus and his successors "discovered" America was the wild turkey known to any writers of books. Cortez apparently took the wild turkey back to Spain "following his explorations in Mexico." From there the bird spread to other parts of Europe and, domesticated, returned in a later century with the colonists to America, where it became a favorite barnyard fowl. In the meantime the still wild descendants of the Thanksgiving bird's ancestors became scarcer and scarcer and disappeared from much of its former range. Mr. Latham quotes Dr. C. H. D. Clarke of Toronto:

"The curtain came down simultaneously on turkey and forest. The last bird may have been shot, but if he was, it was the axe and not the gun that made him the last."

The wild turkey was a magnificent fowl of the wilderness. Our author calls it "the largest, the most intelligent, and the most prized upland game bird on the North American continent." Benjamin Franklin proposed it as the national emblem. John James Audubon painted the bird in splendid color and placed it, life size, erect, as proud as an emblem, on the first plate of his elephant folio *Birds of America*.

Seth Gordon, himself a pioneer in bringing back the wild turkey to the woods of Pennsylvania, writes in a preface to Mr. Latham's volume:

"Had Ben Franklin's proposal prevailed, and the wild turkey (instead of the bald eagle) been used on the Great Seal of this new Nation to symbolize our liberty and independence, this grand game bird of forest and glade would undoubtedly have been idolized—and restored to abundance long ago."

Turkey as a symbol

Mr. Latham sees the turkey "as a symbol of a new American philosophy." He explains:

"Through ruthless slaughter and complete disregard for conservation principles, this bird was reduced to a point near extermination. Then, with a feeling of shame and remorse at this near catastrophe, the people of the United States resolved to right this—and other wrongs perpetrated against our wildlife, our forest, our

soils, and our waters. With perseverance and determination they are accomplishing this task. The wild turkey has been saved and is rapidly being restored to a large part of its former range. This successful restoration program proves that civilized man can live in harmony with Nature."

One of the most interesting of Mr. Latham's "in-harmony-with-Nature" discussions has to do with the attitude toward predators, which Seth Gordon in his preface calls "one of the soundest this writer has yet seen." A curious fact is that the entire work is centered on a most respectable predator—man himself.

The first of three parts of the book deals with the turkey, its history, its characteristics, habits, habitat requirements, and so forth. The second part "concerns the management of the wild turkey in North America," a management that is motivated by the requirements of hunting. The third is devoted to the art of hunting. As Mr. Latham says explicitly:

"The book is written primarily for the sportsman. The early history is given because it should be of interest to him. The discussion of the bird's life history and habits provides the background so essential to success in his sport. The management section is for the guidance of the individual sportsman or the sportsman's club.

Interesting to nonhunter

To the nonhunter, also, this book is intensely interesting and informative. How many are the facts that men have learned about this bird! How much closer we seem to an understanding of Nature than were our Twelfth Century predecessors! What advance over our medieval bestiary!

So we exclaim. But just as one's sense of superiority begins to rise, a curious thought arises too with a strange pertinence. What will Twentieth Century men think? A whole book of knowledge seriously gathered by men, in science and technology, for the sake of the sport of shooting the creatures of its concern! A bird, symbol of "a new American philosophy." Curious, is it not? "Harmony with Nature."

So we find a kind of richness of sharing, in trying to sense the human validity of both Twelfth Century moralist and Twentieth Century manager, in the world of wildlife.

Complete Book of the Wild Turkey. By Roger M. Latham. Harrisburg, Pa.:

The Stackpole Co. 1956. (18) + 265 pp. (6 by 9 in.) with 18 illustrations (drawings) by Ned Smith and list of references. No index. \$4.95.

The Book of Beasts: Being a Translation from a Latin Bestiary of the Twelfth Century. Made and edited by T. H. White. New York: G. P. Putnam's Sons. 1954. 296 pp. (6 x 9 in.), with end papers and 128 text illustrations reproduced from original manuscripts and later sources, bibliography, and index. \$5.

Wonders of the Bird World

By Helen G. Cruickshank. New York. 1956. Dodd, Mead and Company. 95 pages. Illustrated with photographs by Allan D. Cruickshank. \$2.50.

This is a fascinating introduction to an interest in and understanding of birds. Although the publishers indicate that it is intended for an audience "from 8 years up," we would be inclined to emphasize the "up." There is no "writing down" to juvenile readers such as is found in many introductory books, and the adult reader will enjoy it fully, particularly, of course, one who has not already learned much about the wonders in the world of birds.

Exploring American Caves

By Franklin Folsom. New York. 1956. Crown Publishers. 280 pages. Illustrated. \$5.00.

This latest addition to the growing library of speleological writing has been prepared in cooperation with the National Speleological Society. It is a history of American caves, covering their geology, their lore and their location. It is, at the same time, a guide for cave-goers, who are known as "Spelunkers." Within its covers are assembled an up-to-date directory of the caves that are open to the public, information on local groups interested in caves, advice to the spelunker and a glossary of speleological terms.

Dog Pets

Pet Basset Hound by Mrs. Travis Look; *Pet Brittany Spaniel* by Evelyn Monte; *Pet Miniature Pinscher* by Margaret R. Bagshaw; *Pet Manchester* by Janet Mack. Fond du Lac, Wisconsin. 1956. All-Pets Books. 64 pages each. One dollar each.

This is a group of four new and practical books on these breeds, providing information on the care, training, and enjoyment of these canine pets.



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Reviews

Pheasants in North America

Edited by Durward L. Allen. Harrisburg, Pa. 1956. The Stackpole Company. 490 pages. Illustrated. Colored frontispiece by Bob Hines. \$7.50.

For the preparation of this Wildlife Management Institute publication biologists in both Federal and State employ and from private institutions collaborated. Under the editorship of Dr. Allen, Associate Professor of Wildlife Management at Purdue University, their contributions are brought together to supply an important and up-to-date work on the status of the ring-necked pheasant today. This Asiatic import has adapted itself widely to habitats throughout the northern part of the United States from coast to coast. It has taken the place in many areas of the native species whose lives were upset by man's impact, and has become important in our avifauna.

Biographical Memoirs

Published in 1956 for the National Academy of Sciences by Columbia University Press, New York. 359 pages. \$4.00.

This is the twenty-ninth volume in this series and presents brief biographies of twelve men of science who have passed away recently, most of them quite recently. They are Charles Elmer Allen, George Francis Atkinson, Douglas Houghton Campbell, Raymond Dodge, Dennis Robert Hoagland, Herbert Eugene Ives, Arthur Keith, Arthur Becker Lamb, Joseph Haines Moore, Joseph Fels Ritt, Carl Emil Seashore and Frederick Eugene Wright. With each biography a bibliography of the subject's writings is included.

Canoeable Waterways of N.Y. State

By Lawrence I. Grinnell. New York. 1956. Pageant Press. 349 pages. Illustrated. End map of waterways. \$5.00.

In gathering material for this splendid guide the author and his wife traversed some 4700 miles of the waterways of New York State. This fact gives not only great authenticity to this excellent guide but adds color and enthusiasm to the descriptions of specific canoe routes. A retired business man who left the marts of trade to devote himself to ornithology, Dr. Grinnell has studied and photographed birds over a

wide area of the United States. He is also a canoe enthusiast, as this book amply testifies. An opening chapter provides practical advice on preparation for a canoe or foldboat trip, and a second chapter treats with canoeable waters generally and provides a basis for rating them. Then the text proceeds to specific trips and data about each one. Much information is provided in statistical tables. We should say that this book is entitled to be called unique.

Wonders of Science

By Gary Webster. New York. 1956. Sheed and Ward. 135 pages. \$2.50.

In this little book the author discusses ten natural phenomena—the migration of animals, termites, light, photosynthesis, air, water, gravity, salt, volcanoes and lightning. He explains each scientifically, presents odd facts about them, and finds in each a mystery that points to God. The author's approach is that of journalist and educator, and is provocative and stimulating.

Spring on an Arctic Island

By Katherine Scherman. Boston. 1956. Little, Brown and Company. 311 pages. \$5.00.

Bylot Island lies four hundred and fifty miles north of the Arctic Circle and north of Baffin Island. It was the goal, in 1954, of an expedition of eight persons sponsored by the New York Zoological Society and the Arctic Institute of North America. It was a scientific project, five of the eight members being trained scientists with a background of field work in the North. The expedition penetrated a wilderness country, lonely and mountainous but the favored nesting place of some thirty species of birds and the growing place of many kinds of hardy flowering plants. This book, however, is not a scientific report but a fascinatingly readable personal record of the country and of human and natural life there. The author is a trained journalist with a love of the wilderness and an interest in ornithology. Her story of this return to the ice age is a notable contribution to the literature of the far North.

Wonders of the Aquarium

By Sigmund A. Lavine. New York. 1956. Dodd, Mead and Company. 87 pages. Illustrated by Ernest H. Hart. \$2.50.

When the author started to teach school he also started to raise tropical fishes in the classroom. He found an eager interest in this activity on the part of members of his classes. So this introductory, practical book is directed toward the novice fish-keeper, and introduces him to the interesting dwellers within the glass sides of the aquarium.

Briefly Noted

Plant Physiology. By Meirion Thomas. New York. 1956. Philosophical Library. Fourth Edition, revised. 692 pages. Illustrated. \$12.00. Revised edition of this text by the Professor of Botany, King's College, Newcastle-upon-Tyne in the University of Durham.

The Little Ones. By Inez Hogan. New York. 1956. E. P. Dutton and Co. 45 pages. Illustrated by the author. \$2.25. About the small mammals of the forest for the quite young reader.

Psychical Research. By R. C. Johnson. New York. 1956. Philosophical Library. 176 pages. \$2.75. A popular treatment for the thoughtful person interested in the results of application of experimental method and statistics to the field of psychical research.

Thresholds of Existence. By Upton C. Ewing. New York. 1956. Philosophical Library. 286 pages. \$3.75. The author presents a theory of creation and of evolution as a way of life.

Preface to Empathy. By David A. Stewart. New York. 1956. Philosophical Library. 157 pages. \$3.75. In this book, empathy is thought to be the most important act in the life of human beings who aspire to be persons.

Man. By A. da Silva Mello. New York. 1956. Philosophical Library. 729 pages. \$6.00. A Brazilian physician discusses man, his life, his education and his happiness.

Dictionary of Dietetics. By Rhoda Ellis. New York. 1956. Philosophical Library. 152 pages. \$6.00. Compilation of terms and references related to diet and diet therapy.

The Art of the Aqualung. By Robert Gruss. New York. 1956. Philosophical Library. 66 pages. Illustrated. \$2.75. Little, practical book on swimming and exploring under water, translated from the French.

Contents noted

BY THE EDITOR

THE McNARY WILDLIFE MANAGEMENT AREA

has been officially designated by the United States Fish and Wildlife Service. Over a considerable span of years the late Charles L. McNary served with distinction as United States Senator from Oregon. He was an active and informed conservationist, and he has left his name in the title of important pieces of forest conservation legislation. He also served as a member of the Migratory Bird Conservation Commission. It is therefore most fitting that his name should also be given to an area of 2849.14 acres of wildlife land in Franklin and Walla Walla counties in the State of Washington. Curiously enough, this area will partially replace islands in the Columbia River that were important resting places for Canada geese but were submerged by the McNary Dam in the Snake and Columbia Rivers. There are some seven hundred acres of excellent waterfowl marsh at McNary, and these acres will be a feeding and resting ground for migrant birds.

THE ROSE AS OUR NATIONAL FLOWER

seems to be gaining support throughout the country. The public information office of All-America Rose Selections reports that a public opinion poll of the women's editors of daily newspapers finds these editors heavily in favor of the rose. Ninety-four percent thought the rose the most popular flower among American women; 88 percent personally favored the rose to any other flower; 96 percent felt that the United States should have a national flower; 89 percent felt that the rose was the natural choice for that distinction. When the American Nature Association conducted its national poll to determine sentiment for a national flower a majority of the more than one million votes cast were for the wild rose, with the columbine a good second. A resolution is pending in Congress to designate the rose, although there is no attempt to designate a particular species or variety, whether wild or tame. Individuals interested in favoring or opposing the selection of the rose may register their opinion by writing to Hon. Paul C. Jones, Chairman, Library Sub-Committee, Committee on House Administration, House Office Building, Washington 25, D.C.

AN ESTIMATED 100,000 DUCKS AND GEESE were killed by market hunters in the region of Beaumont, Houston and Galveston, Texas, during a two-year period.

It will surprise many that this sort of illegal killing goes on, and it is one of the headaches of the U.S. Fish and Wildlife Service. Picking up market hunters one by one is a slow and unsatisfactory task, so, faced with gross violations, the Service moved its undercover enforcement men into the area to gather evidence that would eventually permit mass arrests and smash the illegal shooting. This was a two-year task, but it was cleverly and courageously done. Fifty-three warrants for arrest were finally issued, forty-four of which have been served and the violators arrested and arraigned. The other nine are still being sought, three of them being known to have fled Texas. This is the largest raid yet on a market-hunting ring. Unfortunately, there is a considerable demand for illegal waterfowl among clubs operated by individuals who see no crime in violating the game laws. Also individuals with moral astigmatism purchase the birds for parties or social occasions, or prefer to buy the birds rather than go to the trouble of hunting them.

SMOKEY BEAR IS ON THE JOB IN 1956 again, carrying the message of fire prevention in forests and on range land. Probably only a small percentage of our citizens who see—and heed—Smokey's call to arms realize that this educational program is a public service project of The Advertising Council, Inc., worked out for and in cooperation with the State Foresters and the United States Forest Service. For 1956 the volunteer advertising agency skillfully preparing the many-phased program is the firm of Foote, Cone and Belding of Los Angeles. Posters, newspaper advertising mats, cartoon strips, radio and television spots, blotters, book marks, stamps and other publicity material are prepared. Kits are made available through State Foresters, Commissioners of Conservation, local chapters of the American Red Cross, regional offices of the U.S. Forest Service, and the headquarters of the Service in Washington.

AS ROADSIDE DESERTS INCREASE public opposition to the practice of indiscriminate control of vegetation by sprays increases in proportion. The automobile-traveling American people are given ample opportunity to see the dead and unsightly roadsides and to wonder what is happening. This situation is, of course, the result of the unfortunately widespread acceptance of high-powered, non-selective chemicals by State highway departments and local highway officials. Last year, for example, Sullivan County, New York, set out with great fanfare to do away with roadside ragweed. Ten spray trucks embarked on this task. Such wholesale chemical application killed the ragweed, but it also killed all other plants and created an ideal condition under which ragweed will grow more luxuriantly another season. From the point of view of conservation the chemical age in which we are living is not all on the positive side.

R. W. W.



PHOTOGRAPH BY THE AUTHOR

THE WILL TO SURVIVE

Anchored in the vitals of the rock, tenaciously it fights for life—and, in that fighting, grows.

Buffeted by winter's howling winds and driven snow, encased in heavy ice, it tucks its head and hugs its bony stems and waits for warming spring.

Then summer comes, with blazing sun; and drying, scorching breath portends insidious drought.

Yet, in the rock, the plant lives on—and autumn turns to fall.

The buds are set, and some day hence will greet the misty morn.

The seed pods, packed with living cells, will throw them to the winds of chance;

And generations yet unknown will trace back to the rock the strength born of adversity.

And thus it is with man.

'Though God plants some lives in fertile soil, He sows the most on rocky ground.

For, here, mere struggle to survive soon nurtures strength for greater things.

And thus, in His transcendent plans, He makes each man the master of his own destiny.

Edward L. Manigault

DUEL IN THE SKY

By JOHN LINDSEY BLACKFORD

The golden eagle, whose fierce pride and noble bearing are matched by surpassing skill on the wing.

PHOTOGRAPH BY GEORGE M. BRADT



WHIRLING in air like a great wheel, the golden eagle spun over on his back, mighty talons poised to strike—

Below me, minutes before, the powerful raptor had launched out from scattering yellow pines on the high hill slope. Soon he was banking upward in vast spirals in the deep river-canyon. Far beneath him curved the Kootenai.

Twice already on that May afternoon I had watched a mountain eagle soaring over this open hillside forest in northwestern Montana. Now another took note of the aerial intrusion. Abruptly the golden hunter was challenged as he wheeled there in the wide gorge. While my field glasses traced the impressive sweep of the rising eagle, a red-tail, largest of the buzzard hawks, dove steeply down upon him.

It appeared that the hurtling hawk must certainly strike the broad shoulders of his circling adversary. But on the instant, whirling over high in air, the eagle thrust up menacing talons to meet the plunging *buteo*. The attacker glanced on past, so close it seemed they surely met, save that in the same second the eagle completed his whipping wing-over.

Quickly each strove with obvious power to mount above his antagonist.

Years before I had closely followed a brief account of

a young bird turning on its back to parry the thrusts of an osprey, and of the skillful defense of a golden eagle as it sprung from the ground to reach up with clutching claws for his hawk assailant. Enviously, I knew many long seasons might separate me from seeing such a wilderness encounter, if, indeed, I were ever so fortunate as to behold it. Not only are the odds of time, place and event stacked against one; but many of our most spectacular wildlife forms are vanishing so rapidly as to reduce even the possibility.

Yet now, suddenly, such a clash was unfolded before my eyes—the feathered gladiators swinging back to the attack in mid-air!

It was clear, at once, that there was no contest in the effort of the birds for altitude. Although driving far below, the now-soaring red-tail, within fifty seconds, regained such height as to close in swiftly from the side. Again, as the hawk slashed by, the eagle rolled. Over on a wing-tip, with whirling pinions vertical, his threatening talons met the flashing hawk. Then, continuing the splendid spin, and swift as the eye could follow, the master of the skies righted himself in forward flight and proceeded undeterred on his upward-circling course.

It was surprising how quickly the banking hawk rose above the big bird. In a minute or two—or less if he

slanted in low at the same level—the red-tail was repeating the attack. Mounting in tighter circles above the eagle, as the two spiraled high over the nearer river flat, the hawk would pitch down in a steep glide upon the mighty hunter.

Although not dwarfed to kingbird size, as when that darting tyrant flycatcher torments the big red-tail, the great hawk by comparison was himself reduced to markedly lesser dimensions. As they seemed to close in swirling combat, the pair might fall away below my station on the open pine slope. When in soaring recovery, they rose above it.

Twice I partly missed the moments of slashing "contact." Then learned, when the hawk swung in, to keep my glasses on the more slowly cruising eagle. Divergent sweep of concentric spirals carried them far apart; then, as irresistibly, drew them together again. At three to four hundred yards, eight-power binoculars brought them to me at a fraction of their distance.

Seven or eight times the red-tail struck at the mountain eagle. In the instant of attack he always faced the

whipping wing-roll of his giant adversary. Usually the whirling eagle revolved upon his back as they almost met. Each time the wing-over was a complete barrel roll, executed so skillfully that the eagle's claws were ever waiting when the hawk shot past. The wonder of it was the full spin, accomplished in a second or two, and with such accuracy as to meet the plunging hawk with ready talons at the precise instant of lightning passage!

The dueling pair seemed ever certain to close and fall in clawing, aerial battle. But doubtless the hawk never entertained such fatal intentions. I strove to determine the nearness of the flashing combatants. Never did they appear to miss by more than the wingspread of either bird. The impression was always of imminent peril and collision.

Then I wondered about that steep, attacking swoop of the red-tail, recalling now the plummeting plunge of the prairie falcon, and the wild, deadly, rocketing stoop of the duck hawk. Yet those aerialists strove for the kill. The *buteo* knew better his own prowess.

Had he ever dropped in vertical power dive, the big buzzard hawk could not likely have swerved in the final instant. There would surely have followed the fall into *Aquila's* fateful clutches.

Why then the attack?

On several previous occasions I had noted the eagle passing in far, majestic sweep as he patrolled the high summits of the ranges. Undoubtedly the area lay within his rightful hunting range. But at this lower mid-level, I knew, he trespassed upon the nesting territory of the red-tailed hawk. That redoubtable raptor, perhaps with mate watching from a stick-nest castle in some dead-top pine of the rocky, ravine-cut slope, had undertaken to rout the great intruder.

Obviously the red-tail

Perhaps the female red-tailed hawk watched her mate in battle from her stick-nest in some dead-top pine of the ravine-cut slope.

PHOTOGRAPH BY KARL H. MASLOWSKI

Nature Magazine





PHOTOGRAPH BY THE AUTHOR

It was in the Kootenai country of northwestern Montana that the author saw the exciting duel in the sky and its avian skill in the air.

could do no more than harry the mountain monarch. Yet he accomplished it by thrilling, seemingly perilous maneuver; and with spectacular effect. The golden eagle, recognizing, no doubt, his encroachment, abruptly left the arc of mounting flight and broke off the engagement. Heading for the mountain slope, the harrassed hunter passed directly over me, just clearing the short pines. On his approach, my following binoculars revealed at startling range the cleaving strokes of those

massive pinions; and twisted my back in their swift overhead pursuit.

The challenger continued to wind steadily upward, high over wooded river flats below. At last but a cruising speck, he vanished from sight and was lost among drifting clouds.

The hawk had done well. He held the field of honor—yet had not fallen into the mighty clutch of *Aquila's* claws. Red-tail was victor of the duel in the sky! 🦅

SQUIRREL IN A PINE WOOD

*This flash of fur, outdistancing the eye,
Accepted by the birds, lives close to sky.
Fluid and swift, he flows along the green
More silently than wind. He has been seen
As some outcropping of the rugged bark,
So flattened to the trunk, so shadow-dark.
And should he speak, half-animal, half-bird,
The ear will not believe the sound it heard.
But careful watchers find the jeweled face
Staring defiance at a clumsy race.
The fox-bright plume, gold tipped as summer dawn,
Flicks in disdain — and what was there is gone!*

Elma Dean



Among the most graceful and beautiful mammals is

The Marten

By EDMUND J. SAWYER

Illustration by the Author

IN APPEARANCE the marten is a sort of large weasel. More nearly of kin is the larger and rarer fisher, which, in turn, is a small first cousin of the wolverine. On the ground the marten reminds one of a large, golden-brown, squirrel-tailed weasel, but in a tree he is another creature, suggesting a big squirrel, whether at rest or moving. The marten's head, however, especially if the animal is facing you, is distinctive and unmistakable. Its ears, much too prominent for either weasel or squirrel, are fox-like.

The marten is impressive in size, for its body length, including the head, is about twenty inches and its tail some eight inches. This little animal is known to most people only as a fur-piece. Yet alive and in the wild it is perhaps the most beautiful and graceful of our mammals.

While there is abundant data, going back to the early days of trapping in North America, about the marten as an object of commerce, its ways are not known in great detail. Its den is usually in a hollow tree. Its young number one to five, and their condition at birth and at equal periods of development is similar to cats and raccoons. The marten's food is both animal and vegetable.

A deliberate search for this scorner of human kind is seldom successful. He is all too willing to play hide-and-seek if only he can be "it," and, almost always, he can. On the other hand I have known a marten, doubtless enticed by the aroma from an open can of salmon, to enter a remote log cabin in Yellowstone National Park. There, growling and showing fight, he defied repeated efforts to drive him out with a broom.

Yellowstone is one of the few remaining areas in the United States where the marten, exempt from trapping and shooting the year round, is still not uncommon. But such is the surpassing cunning and woodcraft of the animal that in four years, as a Park naturalist with a rather special interest in martens, I was able to see this elusive creature less than a half-dozen times. Yet it is safe to say martens saw me many times as often.

In his *Lives of Game Animals* the late artist-naturalist, Ernest Thompson Seton, writes: "Although I have spent, all told, many years in marten country—in Ontario, Quebec, Manitoba, the Mackenzie, the Rockies, and the Sierra—I never but once saw a live, free marten."

The Yellowstone, incidentally, was a favorite part of Seton's stamping ground. The marten's affinity with freedom, his all-out dedication to wildness, warm and exhilarate you. Found in a human being, we would call such quality a kind of nobility. Experienced marten trappers have told me that a marten, caught in a trap only by as much as one paw, will simply give up and die even before hunger and exposure could have any effect.

Characteristics that are sure to impress the observer of a free marten are its agility and nervous energy. A tired marten seems unthinkable. In his endless travels he is the master of the branch-to-branch, unblazed trails. From the friendly, foliated limbs that give him safe concealment he looks the stranger over with a scrutiny that misses nothing. Then, with dignity, and having given no sign of his presence, he silently withdraws.

During World War II, my wife and I, with our two small cocker spaniels, spent the winter as airplane spotters for the Army in a lookout station on a remote peak of the Cascades. Here the rarest of our rare visitors was a single large and beautiful marten. When first seen he was inside our deeply snow-bound, makeshift storm-house, intent on a high-hung slab of bacon. Whether due to our appearing almost at arm's reach, or to the scent of our dogs, or both, he was frustrated immediately. Yet he took his leave in silence, without the slightest haste or loss of face. What a contrast to that other marten in the Yellowstone cabin!

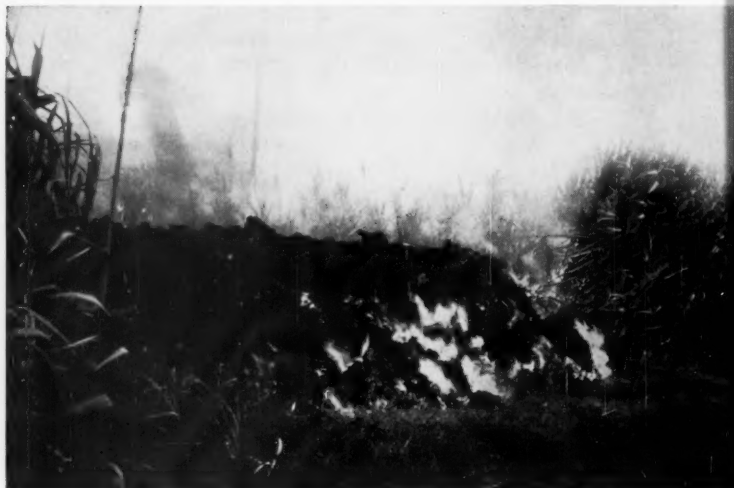
To what diabolical quirk is it due that, among mammals, we select as victims for special persecution and, possibly, for eventual extermination this foremost exemplar of beauty and grace—the marten? Due mainly to persistent trapping, martens have been exterminated in a great part of their former wide range. A continuing demand for their fur must wipe them out except where they are protected. So austere are the conditions of weather, so wild and rugged the terrain where the successful marten trapper must ply his trade, that only a high price for the fur can induce him to face the hardships involved. Of course the dictates of "fashion" set the price on this animal's head. The destiny of the marten is in the hands of the ladies!





A small volcano erupts with a mighty roar and a spurt of lava, placing a real roadblock right in the middle of a road in the Puna district of Hawaii Island.

The front of a blazing lava flow plows through a cane field in the 1955 Puna eruption. Almost 600 acres of caneland were destroyed, and 240 acres isolated, with a loss of almost \$3,000,000, during the eruption. Papaya fields and coffee fields also suffered damage.



Birth of A Volcano

How does a volcano act when it is coming to life? Curtis Kamai, an employe of the Territorial Public Works Department, offers this description:

"It was just like touching off a half-mile-long string of gunpowder. I heard the roar of the lava beneath me. The ground was shaking. Then, suddenly, up it went like a powder train. In two minutes the whole half-mile stretch was blazing one hundred feet in the air."

Shunji Ikeda, an independent sugar cane planter, was working in his field when he noticed smoke shooting up next to his house.

"I thought my house was burning," he related. "I dropped everything and ran. Then I saw lava shooting up right beside my house. I didn't know what to do.

"**W**E WERE eating lunch and had the food spread out on the ground before us. Suddenly, we noticed cracks opening up in the earth under our sandwiches. We took off like scalded cats."

This is how one eye-witness described the beginning of the volcanic eruption on the island of Hawaii, Territory of Hawaii, during the early months of 1955.

Volcanic outbursts are nothing new to America's mid-Pacific territory, but last year's eruption was unique in one respect, according to Dr. Jerry P. Eaton, seismologist of the Hawaiian Volcano Observatory.

"For the first time," he said, "we witnessed, from start to finish, the development of new volcano vents, and the formation of a pit crater."

The eruption began on February 28 in one of the vents of Kilauea volcano in the Puna district, which lies on the southeast corner of the "Big Island" of Hawaii. It is a rich agricultural and cattle-raising area.

My friends were working behind me. My house and all my things were in danger. I turned to warn my friends. Then, when I looked again, I saw a fountain of lava shooting high over my house. It was completely destroyed."

The eruption, which lasted until May 26, reduced the biggest papaya farm in the United States, covering 110 acres, to a twenty-five-acre island completely surrounded by lava. In some cases, the end came violently. In others, the lava crept forward until it engulfed everything in its path.

The Olaa Sugar Company and independent cane growers in the area lost more than 1500 acres of cane to lava, cinders and fire. The sugar loss, after insurance recovery, was \$1,750,000.

Many small farmers saw their life's work obliterated. One had only thirty-seven acres of sugar cane left, out of a total of more than three hundred. The total loss suf-

By OTTO G. JANSSEN

Photographs from Honolulu Advertiser

fered by the 7000 people of the Puna district, either directly or indirectly, has been set at \$2,875,000.

Dr. Eaton and Dr. Gordon A. Macdonald, the Observatory's volcanologist, are still studying the results. Dr. Macdonald believes the eruption has provided valuable information, but he admits "we are in the state of volcano diagnosis that physicians were in regarding the diagnosis of human disease 150 years ago. . . We are never able to predict more than a month or two in advance, and sometimes we cannot predict at all."

The scientist says there "obviously" will be another eruption, but he did not speculate as to when. Those who believe that Madame Pele, the goddess of Hawaiian volcanoes, controls the outbreaks and sends the fire up



Huge white steam clouds rise from the shore as the lava flow enters the sea. A new peninsula was created by the tons of molten rock that were pushed into the water.

A backyard volcano erupts and sets fire to a home during the March-April, 1955, eruption in the Puna district. This prize-winning photograph of the damage caused by this volcano was taken by Bob Monahan, a reporter on the staff of the *Honolulu Advertiser*.

from the earth when something displeases her, are more certain. Among these is Lee Chong Leekai, an old time Hawaiian who is a park caretaker on Hawaii.

He says, quite definitely, that Pele is going to set the earth shaking again in 1961, and this time she will loose her full fury. He predicts most of lower Puna, and possibly the famous "black sand beach" at Kalapana, will be wiped out.

The 1955 eruption was, according to Dr. Macdonald, "the first experience with an eruption in a populous area in American territory."

For many years, leaders in the Territory have advocated measures to protect life and property, or at least lessen the damage. The town of Hilo, second largest city in the Territory and an important port, lies at the foot of the volcano slope and is particularly vulnerable.

Dr. Macdonald recently stated publicly that "it is just a matter of time" until the northeast rift of Mauna Loa produces enough lava to reach Hilo.

However, he said that barriers, if prepared in advance of an eruption, have "a better than 90 percent chance" of saving the Territory's second largest city. In 1881, a flow from the northeast rift stopped one mile short of Hilo bay. In 1942, a flow came to a halt six miles from the shore above Hilo.

There have been some suggestions that the power from Hawaii's volcanoes be harnessed for useful purposes, but Dr. Macdonald says the quality of the Hawaiian rock would probably defeat such an attempt.

The main proposal is to construct an earthen barrier in front of the city and other populated areas that may be endangered by future eruptions. A request has been made to the Federal Government to consider such a wall.

From the detached viewpoint of the geologist, Hawaii's volcanic eruptions are a fascinating study in Nature's land-building processes. The latest Puna eruption covered some six square miles of land and added an estimated 120,000,000 cubic yards to the Big Island.

Nevada's Alpine Roof

On Charleston Peak's upper slopes is the largest pure stand of bristlecone pines in the United States. Some of the trees are seven feet through and seventy feet high.

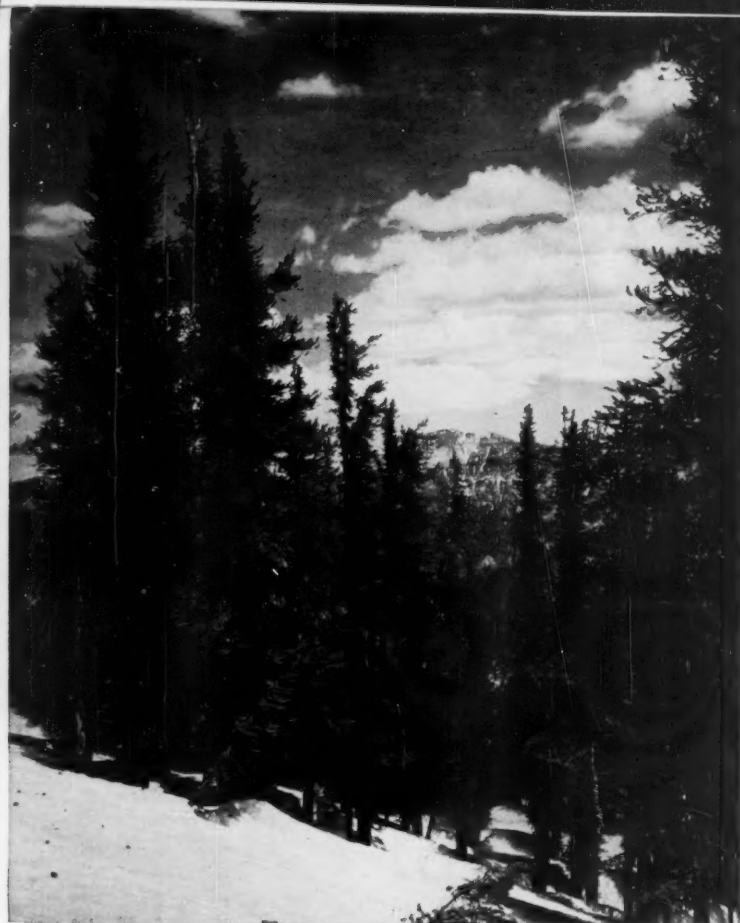
One of the most spectacular of these southwestern "Sky Islands" is the Spring Mountain Range in southern Nevada. Extending north and south for seventy miles, and twenty miles across at its widest point, this rugged range culminates in one of the Silver State's highest and most imposing group of summits. Topping them all is the bald, rounded knob of Charleston Peak, which soars abruptly into the blue southwestern sky almost 10,000 feet above arid Las Vegas Valley, and 11,910 feet above sea level.

Here, from base to summit, stacked one above another, are six of the seven North American climatic life zones, from Lower Sonoran to Arctic-Alpine. Only the Tropical zone is missing. So, within sight of each other, are compressed a sample of the climates you would encounter on a 3500-mile trip from northern Mexico to the Bering Sea. No wonder botanists, zoologists and naturalists come from all over the country to study this amazing isolated mountain oasis above the Nevada desert. They have been rewarded by finding more than 400 species of

plants, and an abundant and varied mammal and bird life. Many of the plants are new to science and others may prove to be endemisms found nowhere else.

As I am an inveterate collector of southwestern mountain-tops, Charleston Peak was long on my schedule. However, for one reason or another, year after year, I had to be content to look at it covetously as I passed through Las Vegas on my way to somewhere else. But finally one mid-June morning a companion and I started out—destina-

From the summit, a horseshoe of banded limestone cliffs drops 4600 feet into the depths of Kyle Canyon. Beyond, the road goes down to the desert at Las Vegas.



FROM the arid valleys and deserts of the American Southwest rise scores of mountain ranges. Each one is different. All are fascinating because they form climatic, botanical and faunal islands in sharp contrast to the parched lands below. Between west Texas and southern California are numerous places where you can drive a car in an hour from cactus, yucca and creosote bush to the cool greenery of pine, fir and aspen forests, or change your climate in half a day from searing subtropical heat to icy blasts like those of Arctic wastes.



By WELDON F. HEALD

Photographs by the Author

The Charlestons are one of Nevada's most imposing group of alpine peaks.

tion Charleston Peak. As we drove east across the shimmering desert the temperature was 104 degrees, and our spirits drooped like Dali's watches. We asked each other why we did these things. But nearing Las Vegas, we suddenly forgot heat and discomfort. For, to the northeast, outlined incredibly high against the sky, was a cluster of snow-capped peaks. They were our mountains, shining pure white like a towering bank of cumulus clouds, and they seemed as remote and serene as another world. Our flagging energies immediately revived and the accelerator needle rose another notch.

The Charlestons, as local people call the Spring Mountain Range, are an escape hatch for Nevadans from the blistering summer heat, and are also an increasingly popular winter sports center. From Las Vegas, a high-gear, paved road leads thirty-six miles to the head of Kyle Canyon, 7300 feet up on the east side of the range. Here, among ponderosa pines, white and Douglas firs, and aspens, are a lodge, cabins, stores and improved campgrounds. It is a grand spot under a gigantic horseshoe of banded limestone cliffs, topped by Charleston Peak, 4600 feet above. From the end of the road an eight-mile trail winds up these precipitous mountain walls to the ridge, which it follows northward to the summit.

But on arrival at the campgrounds, we saw that the trail would be of no use to us whatever. The preceding winter had been one with unusually heavy precipitation throughout the West. The cliffs, ridges and peaks were still loaded with tremendous masses of snow. The trail was deeply buried for nearly its entire length. So we dropped in at the ranger station to talk with the district ranger who had charge of this detached, hundred-square-mile section of Nevada National Forest.

Looking down the long southern ridge with its plunging, snow-covered slopes, and curling cornices like frozen ocean breakers.



He told us that no one had attempted to climb Charleston so far that season and he strongly advised against it. So did the manager of the lodge and the storekeeper. In fact, everyone we talked with flatly stated the mountain could not be climbed for another month, at least. These gloomy reports convinced my companion that the charms of Kyle Canyon were enough to satisfy any reasonable person. However, I have an almost pathological addiction to mountains with snow on them. So I rolled up in my sleeping bag under the aspens early that





The chilly, barren top of Charleston Peak has a summer climate resembling the furthest north coasts of the Bering Sea.

night, having Charleston Peak still definitely on the agenda.

Next morning, after a hasty breakfast, I started up the trail at 7:15. In a half-mile the path disappeared under avalanche snow and I never saw it again, except in a few wind-swept spots on the high ridges. From there on I had to pick my route. Although the slope to the ridge is 3800 feet high, steep throughout, and broken by cliffs, fortunately the snow was in good condition, firm and well-compacted. Most of the way I could trudge upwards or kick footholds, but here and there were pitches requiring step cutting with my ice-axe. The going was slow and laborious, and choosing the route took most of my attention. So I had little opportunity to enjoy the fine open pine forest that clings to these plunging slopes, or appreciate the ever-widening views down into Kyle Canyon and out over the desert beyond. As for wildlife, I saw none, and heard only the scolding of long-crested jays and the usual high-mountain greetings from the chickadees and juncos.

Below the ridge I ran into real difficulties. Over the edge swept a continuous cornice of wind-blown snow, about thirty-five to fifty feet high, guarded at the top by a curling overhang. It resembled a giant ocean roller frozen into immobility, and it seemed to have no break anywhere. That cornice almost put an end to my Charleston ambitions. It took me more than an hour to scout out a vulnerable spot, cut steps up the face of the cornice, and hack away at the overhang with my ice-axe until I could break through to the ridge. Never was a goal more welcome than when I flopped over upon the crest after four hours of continuous climbing.

From then on it was a long, gentle pull to the final cone of the peak. The top of the ridge is broad and rolling, gradually dropping to the west in long, sweeping slopes down to Pahrump Valley, 8500 feet below. But the snow was deeply sun-pitted, making the going extremely slow and tiring. Nevertheless, I now had

more opportunity to observe the remarkable forest that covers the upper slopes of Charleston Peak. Between the ponderosa and fir belt and timberline grows the largest pure stand of bristlecone pine in the United States. The trees reach diameters of from three to seven feet and are sixty to seventy feet tall. They form an open, sunny forest, and their reddish-brown trunks and tufted deep-green foliage rising above the brilliant white snow were enchanting.

The bristlecone pine, *Pinus aristata*, is a Rocky Mountain species that hops across the deserts on the backs of lofty ranges to the California line and down into Arizona. Nowhere else, however, does it grow to more than half the size of these giants of the Charlesons. For that reason, and the fact that there it uncharacteristically marches to timberline upright and unbowed, many believe the tree to be the much larger foxtail pine, *Pinus balforiana*, of California's Sierra Nevada. The two do have the superficial similarity of relatives, but the shallowly ridged bark and sharp prickles at the tips of the cone scales identify these trees as true bristlecone pines.

As I slogged upward through the snow, clouds rapidly gathered and a chill wind chased patterns of sunshine and shadow over the ridge. Above timberline the wind buffeted the rocks with weird hollow detonations, and I battled its blasts up the final cone to the top. By the summit cairn I looked at my watch. It was 2:40 P.M.—seven and one-half hours from the start and probably the slowest ascent of Charleston Peak ever made!

The view from the 11,910-foot crest is of the smashing, breathtaking variety that would require hours, even days, to digest properly. Points in Nevada, California, Utah and Arizona can be seen, and thousands of square miles of mountains, deserts, hills and valleys stretch away in all directions to the distant horizon. Particularly impressive is the tremendous drop down the horseshoe of limestone cliffs into the depths of Kyle Canyon. But easily the most dramatic single (continued on page 388)

Horseflies

By RALPH J. DONAHUE

Photographs by the Author

AMONG the summer and fall insect-visitors to the stillwater areas of ponds and sluggish streams are huge flies, commonly called horseflies. These insects sometimes alight on the water's surface to drink, and go coasting along in the wind much as do paper-making wasps. More often, however, these big flies are to be found on the waterside vegetation, where the females come to lay their eggs.

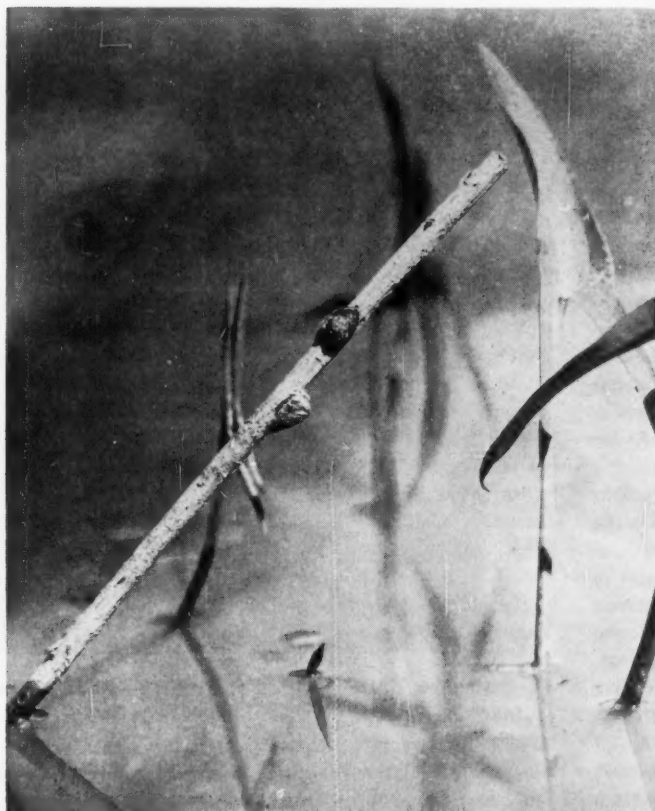
Many of us have seen horsefly eggs, no doubt, without realizing it. Egg-packets of the largest and darkest of these flies, the black horsefly, *Tabanus astratus*, are usually found on weed or grass stems, on the leaves of water plants, or on the blades of cattail. The eggs are deposited at different times during the summer, the earliest being found in June, the latest in September. They are assembled in a mass in the form of conical mounds, at first creamy white, but soon darkening to a weathered gray that makes it easy to overlook them.

Within a week, under normal conditions, these eggs



A photographic enlargement of horsefly egg-packets that also discloses the interrelation that pervades the world of Nature. After the packet-makers had departed, a tiny water spider spun its web over the site, and ensnared a small winged ant. Nevertheless, in due time, the larval horseflies emerged.

Two packets of horsefly eggs on a weed-stem about life size. These are believed to be the nest of the black horsefly.



hatch into slender white larva, spindle-shaped creatures that drop into the shallow-watered margins of ponds. There, they promptly wiggle into the soft protection of the shore mud. For the following several months (for various reasons, the time may be longer or shorter) the larva, moulting its skin as it grows larger and darker, feeds on other mud-dwelling organisms, such as larvae of its own kind, earthworms, and tiny snails.

Thus do the young of horseflies pass the winter. Sometimes, during severe weather, they are actually frozen into the surrounding mud. But such incidents are usually taken in their wiggle-stride, the insects seeming none the worse for the experience. In late spring the larvae transform into the pupal stage, after which they rest about two weeks.

Following this event, some time in May, having divested themselves of their Tabanid pajamas, so to speak, the season's first adults work upward through the mud. Once out into the world of air and light, they are ready to begin anew the cycle of their Tabanid lives.

If one wishes to witness the hatching of larval horseflies, it can be done with little effort. Find a weed-stem upon which the female fly has deposited her eggs, and put it across a tumbler of sand and water. As the youngsters hatch, they drop into the water, where they wiggle about for a while before burying themselves in the sand. In such situations, as in their natural environment, the stronger (or luckier) dine upon the weaker until, at the end of about two weeks, there usually are only a few survivors out of the half a hundred, or more, that hatched from the individual packet.

Should all the eggs laid by female horseflies hatch and all the hatchlings grow into adult flies, these insects would just about put an end to the raising of livestock. And, to date, according to recent reports, there has been developed no spray strong enough to keep these flies permanently away from stock, yet mild enough to be harmless to the farm animals themselves.

However, Nature has her own system of checks and balances. In the case of the black horsefly, one of these restrainers is a tiny parasite that scientists have named *Phanurus tabanivorus*. It hatches and develops within

the eggs of the big fly. This parasite does its bit toward holding down the Tabanid population. Another check, and this might be even better than we know, is the act of cannibalism practiced among the hungry horsefly larva themselves!

According to Dr. D. H. Schwardt, in *Horseflies of Arkansas*, the black horsefly is to be found over much of the United States east of the Rocky Mountains. Its range extends into Mexico and the West Indies. In the northern States, however, it is less common, but everywhere it is a pest to be reckoned with as a worrier of livestock.

The big black fly is a member of the genus *Tabanus* in the Family of the Tabanidae, which also includes such other horsefly and deerfly groups as *Chrysops*, *Atylotus*, and *Goniops*. Among these insects, as might be expected, there is a wide variation as to habitat, traits and coloration. One species builds its egg-packets on stones that are continually in the spray of rushing water; one lays its eggs in decayed wood, not always near water. Still another scatters its eggs singly, or in clusters, on living branches of trees, usually near marshy areas. There is yet another that cements its egg-packets, with a gleaming black plastic, to blades of grass growing in moist pastures. And there is *Goniops chrysocoma*, a fly that has the peculiar habit of actually brooding its eggs until they hatch, after which she promptly dies! 🐝 🐝 🐝

White-Plumed Aristocrat

By NELL MURBARGER

Photograph by the Author

NO KNIGHT of old, riding forth to battle, ever carried his plumed crest more nobly than does the *Nolina* or basketgrass, flowering aristocrat of the desert mountains of our American Southwest and northern Mexico.

At first appearance, the *Nolina* may easily be mistaken for its cousin, the yucca, both species being members of the Lily family, with blade-like leaves, and tall flower stalks bearing large heads of creamy-white blossoms. Closer examination reveals marked differences in the two plants, the most notable dissimilarity being in the blossoms. In the yucca these consist of handsome bells nearly as large as a demi-tasse cup. The flowerlets of *Nolina*, on the other hand, are each no more than one-sixth of an inch in length. Instead of maturing into the horny seed capsules common to yuccas, *Nolina*'s seeds are papery and winged, and cling to the stalk until beaten away by winter storms.

Several species of the plant occur in various parts of the Southwest, that pictured being *Nolina bigelovii*, var. *parryi*. The common name, basketgrass, stems from



Nolina, or basketgrass, is a flowering beauty of our American Southwest.

Indian usage of the coarse, tough leaves as basketry material. Some tribesmen also roasted the young flower stalks for use as food. 🐝 🐝 🐝

Wing Haven

By MYRTLE J. BROLEY

IN THE heart of the residential district of Charlotte, North Carolina, is one of the loveliest of bird sanctuaries. Although automobiles pass continually nearby on the highway, their noise does not seem to penetrate the walls of brick and the shrubbery along the four-hundred-foot frontage. At the back of the grounds, which extend some two hundred feet, a visitor seems to be truly in the wilds. There a little fountain forms a pond that yields tiny rills to attract frogs as well as birds. Wild flowers and ferns nestle against wild shrubs, and there is the flash of many swift wings and the happy songs of birds. Over all is a sense of peace and security.

The beauty and restfulness of these gardens, where birds are so cordially welcomed and so bountifully fed, is due to Edwin and Elizabeth Clarkson. Their delight in their feathered and furred brothers is an outward manifestation of a deep inward love for all the things of Nature, as well as the Creator. Elizabeth's interest in birds stems, in part, from the joy and renewed interest in life they gave her when she was ill some years ago. During the summer months, when she had to lie out on the patio, their cheery songs and brilliant colors helped her forget her pain and weakness. Her husband put out feeding trays, built bird houses and did everything possible to encourage these visitors. Now it is a question which of the Clarksons is the more interested.

Certainly they are tireless in their care of birds or mammals. For ten days they rose every morning before four o'clock in order to look after some baby wood thrushes. One afternoon Elizabeth had found the nest, with two live nestlings and a dead one, on the ground. As there was no sign of the parents, she feared they had been killed. The nest was put back in its place and then watched from behind the shrubbery. Soon the



A plaque in front of this bird bath bears the words of de la Quintinye, a 17th Century French gardener: "Walls are so necessary for gardens, that even to multiply them, I make as many little gardens as I can in the neighborhood of the great one."

male came and fed the babies. But either he did not know how to brood them, or was unwilling. So a hand warmer was put in the nest with them. At sunset the male went away and the little birds were taken from the nest, placed in a warm basket and carried into the house. They were returned to the nest before sunrise so the parent would continue to feed them, and with this arrangement it was possible to bring along the nestlings.

Meal worms come to the Clarkson house in large packages, and are to be found in containers in the house as well as in the beautiful gardens. Grain, seeds, peanut butter and the like are bought in quantities, for at this haven all birds, even starlings and English

sparrows, are fed, as well as any small mammals. Cats are one exception. These are not tolerated, and Bradford, the dog, a stray nursed back to health by Elizabeth, chases feline invaders, although he does not molest rabbits, squirrels, chipmunks, or cotton rats. When he hears, "Cats," he sits up alertly, ears cocked and ready.

On wet days pans of food are placed on the patio with strips of plastic so arranged that hungry ones may feed dryly and in comfort.

Outside the large picture window the formal garden extends to a lovely pool where fish swim busily. Breakfast is usually served in front of this pool, but luncheon, in fine weather, may be enjoyed in one or another of the gardens, depending upon which birds or flowers may be seen. This formal garden is enclosed by a tall hedge of privet.

The Clarksons, like so many other owners of picture windows, discovered such shining expanses are a danger to the birds. Elizabeth found that a curtain made of nylon mesh, and hung on the outside, kept birds away from the glass and from harm by dashing against the pane.



Under this tree in the Clarkson garden the plaque takes its text from Genesis, XVIII:4,5: "Rest yourselves under the tree. . . and comfort ye your hearts."

→

So much food is put out that there is little quarreling among the birds or squirrels. However, the largest containers are massed on one side of the house, near the dining room window, and the most persistent feeders tend to visit these, leaving the other for smaller birds.

Small trees and shrubs have been planted, especially those with berries or fruits favored by birds. "Daphne," the well-trained rabbit who lives in the house, was not forgotten, however. She loves pink roses, and they blossom abundantly at the front of the house as well as in the rose garden. The herb garden is built around a sun dial, which was a wedding gift to the Clarksons about twenty-five years ago.

Frog Hollow, a sunlit pool, presided over by the lovely figures of two children, is well patronized by the birds, as well as the frogs. One of the cardinals is known as the "Frog Hollow Cardinal" because he stays around there most of the time. He comes at one's call, and another redbird, called "Patch Breasted Mama," answers to her name. She is not as sleek as she should be, hence the title. "Mama" has been longest on the place and is quite a pet.

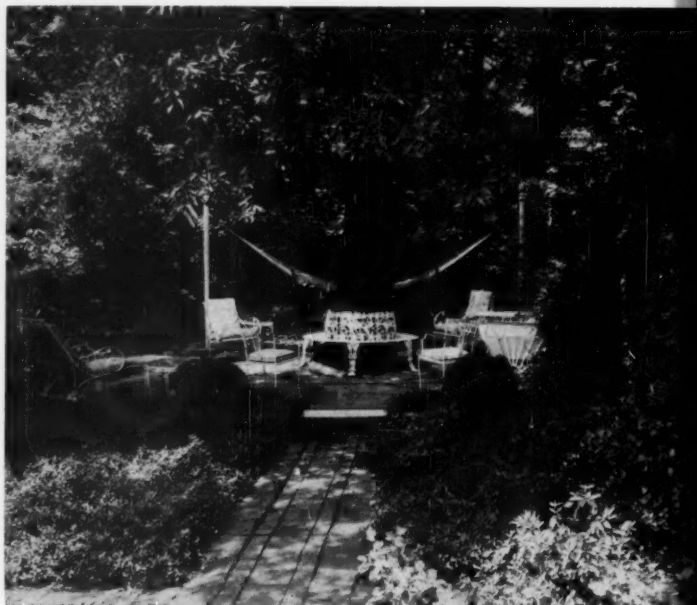
The sorriest little object around recently was a little titmouse whose bill was torn in some way. It could not get its food well, by itself, so Elizabeth and Edwin

broke up worms for the bird, and it took food from their fingers, or from a dish. Although its plumage was rather bedraggled, the titmouse seemed active and in good condition. A hole was left in the bottom of a window sash so that it could come into the house to feed when it wished.

For many years Carolina wrens came in through this hole to feed. One spring Elizabeth noticed one of them flitting about in the bedrooms. Deciding that it wanted to nest in the house, she made a little frame for a nest and put it on a bookcase in one of the green and white guest rooms. Sure enough the mother wren finished the nest and laid five eggs in it. These hatched in due time and the Clarksons were kept busy providing worms for the whole family. Elizabeth was quite provoked when she discovered, after mama wren had herded her little

The plaque that is placed in Frog Hollow quotes Thomas Huxley: "To a person uninstructed in natural history, a country stroll is a walk through a gallery filled with wonderful works of art, nine-tenths of which have their faces turned to the walls."

←



family safely out of the house, that she returned for worms herself but would not allow the young ones to go in.

Perhaps the best known of the many boarders in this haven was Tommy, a bluebird. He lived in the house for eight years, but although he mated and raised a number of families, he did not bring them inside the house.

Many people feed birds, of course, but Tommy is the first bird I have known to try to feed a person. Elizabeth would hear him give his little call, which meant he had

food for her. It was the same note a parent bird gives when bringing food to nestlings. Mrs. Clarkson would make a noise with her finger tips, similar to that made by little birds with their bills. Tommy would fly to her and press the food into the space made by holding a finger against a thumb. Then, satisfied, he would fly off and sing.

Stories about Tommy spread, and the Clarksons became accustomed to strangers stopping them in the street, or driving up to the house to inquire about him.

The garden is a Nature school for young people. Cubs and Scouts come to it for bird study, so pictures of those species that currently may be seen are put up at the appropriate times. Anything special or unusual is given due publicity so that all who wish to do so may come to see it.

From St. Francis of Assisi come the words on the plaque at this bird bath: "My Brother Birds, God give you peace. Much should you praise and love your Creator for he has given you feathers for clothing and wings for flight and all that you have need of. God has made you noble among his creatures, for he has given you a dwelling in the purity of the air."

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The plaque at this pool quotes W. Coles and his "The Art of Simpling": "A house though otherwise beautiful, yet if it hath no garden belonging to it, is more like a prison than a house."

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Throughout the grounds are seats where visitors may rest to enjoy the charming vistas, or wait quietly for birds to come close enough to be fed or photographed. Lovely and appropriate verses, engraved on stone, add to the general beauty, as do the exquisite figures of children or historic lovers of birds.

Recordings of bird songs have been made at Wing Haven, and artists have come to sketch or paint. We were not surprised that it was chosen as the ideal spot for Miss Doughty of Falmouth, England, to visit when she came to the United States to make sketches for the

charming bird groups that are made by the Royal Worcester Company. One of her loveliest designs, myrtle warblers on cherry blossoms, was modelled there. A picture of this was shown in *Town and Country* magazine and a copy of the group is proudly placed on the Clarkson mantle.

While we were sitting near the large front window watching birds feeding at the trays, or from filled logs and so forth on the patio, the telephone rang. Edwin walked over to answer it. I heard him say, "It was all right?" "Oh, fine. Guess it will get along now."

When he returned he explained: "That was the lady who took the vireo south for us. Did Elizabeth tell you about that?"

When so many birds were injured or killed near Charlotte by the ceilometer during the autumn migration, the Clarksons had picked up this stunned vireo. Bringing it back to Wing Haven, they nursed and fed it back to health. By that time all the other vireos had been gone for some time, so the Clarksons went to the airline to book the bird's passage to southern Florida. There they were told that birds were not carried on planes.

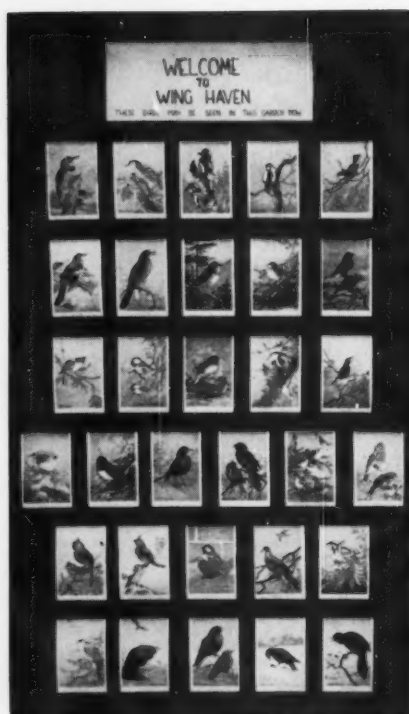
"Perhaps you could find someone motoring south who would take him along," suggested Elizabeth.

The Charlotte papers had carried quite a bit of news

about the effects of the ceilometer, a device for measuring cloud heights, and which had caused so many fatalities to migrant birds. The item about the vireo made the front page of the newspaper. Soon a traveller called to say she was going to Miami and would be glad to take the bird along. The telephone call was from Miami, to say that the vireo had stood the trip well and had been released.

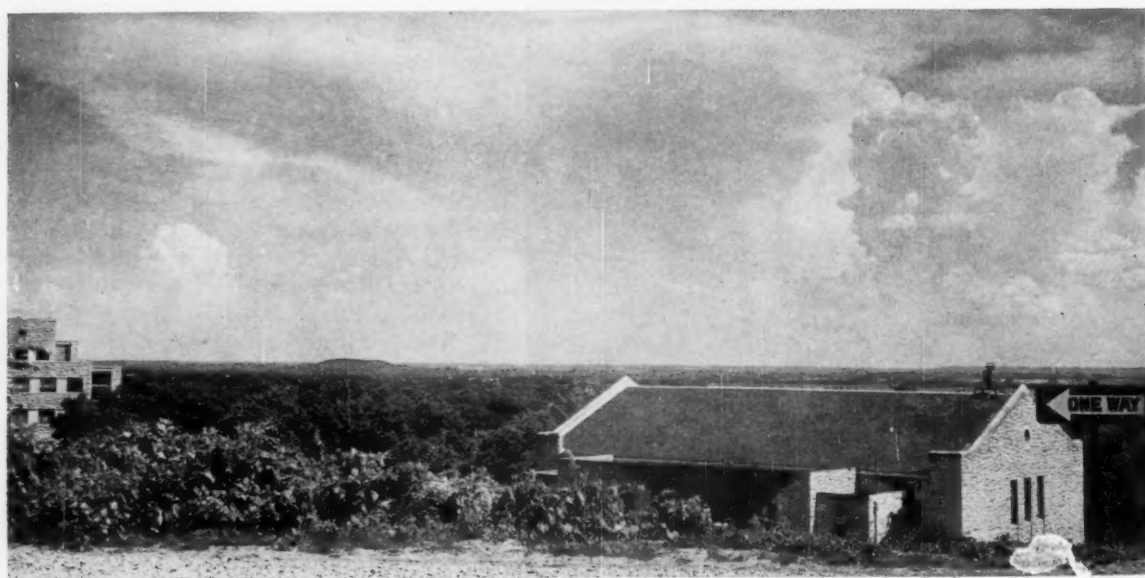
A further profit from this was the fact that the authorities in Charlotte have promised to halt the use of the ceilometer at migration time, henceforth.

In this garden, as nowhere else, we felt that we were accepted by the birds as guests, also. True they awakened us early when they came to the trays. But who could lie abed with a beautiful garden waiting to be explored, with bird songs luring one outside, and with



the knowledge that the charming couple who were on such intimate terms with their bird friends would be delighted to show us their wild pets and allow us to feed them. It did not surprise us to learn that Edwin and Elizabeth Clarkson plan to leave this bountiful garden, well endowed, to the City of Charlotte. So there always should be a Wing Haven.

This welcome sign at the driveway entrance to the garden is changed as the birds come and go with the seasons. Cub and Boy Scouts and other youth groups are welcomed to Wing Haven for bird study.



Kansas Cloud Portrait

By DONALD H. LOKKE and DUKE D'AMBRA

KANSAS clouds are perhaps best known for their destructive activity in connection with tornadoes and hailstorms. On June 21, 1955, a picture was taken from the University of Kansas campus looking southeast over the lower Wakarusa River valley. This photograph was intended to record the cirrus anvil on a cumulonimbus cloud, but upon closer examination a portrait

resembling some figure from early American history was noticed to the right of the main cloud mass and above the building in the foreground. All the features seem to be in their proper orientation and position—nose, lips, eye indentation, forehead, jaw, and powdered wig. A remarkable feat for a cloud; but then, this is a Kansas cloud!



Goldenrods and Asters

By E. LAURENCE PALMER

This is the eighty-seventh in NATURE MAGAZINE's series of educational inserts.



HAIRY GOLDENROD



RAGGED GOLDENROD



GRAY GOLDENROD

MAN TENDS to evaluate parts of his environment in terms of their relation to his problems of food, health, economy and esthetic appreciation. In each of these categories our goldenrods and asters have significance. No attempt is made to suggest the relative importance of the different categories, although it must be recognized that a plant that may have a positive value in one category may have a negative value in another. When all is said and done, however, most of us will sacrifice mundane values for those that appeal to the soul. Your prejudices, true or false, may have set you against goldenrod because you have heard that it is of major importance in connection with hay fever. Nevertheless, you must admit, even through hay fever's tears, that a field of goldenrods and asters, framed with the autumnal color of hardwoods, has something that is bound to stimulate your pulse. Such a scene makes you glad that you are alive and can see what is close at hand.

Celia Thaxter, Bayard Taylor, Lucy Larcom and Helen Hunt Jackson have all been stimulated to write verses about these plants, but I rather think that William Cullen Bryant best presented what I have in mind. He wrote, in "Death of the Flowers,"

"The windflower and the violet
They perished long ago,
And the brier rose and orchis died
Amid the summer glow.
But on the hills, the goldenrod,
And the aster in the wood
And the yellow sunflower by the brook
In autumn beauty stood."

It seemed too much of a project to attempt to give adequate attention to the sunflowers in this insert on goldenrods and asters, so we will have to await a later number to consider them.

Alabama, Nebraska, North Carolina and Kentucky have chosen the goldenrod as their State Flower, but I know of no State that has given the aster a similar recognition. Kansas, of course, has chosen the sunflower as its favorite.

With the exception of the flowers of some asters, and the stems of some goldenrods, red is not a color associated with these plants. Instead they make a major contribution of yellows, blues and purples to our late summer and fall landscapes, adding to the technicolor of the hardwoods late in the season, and usually are closer to the ground. For the most part, goldenrods and asters offer little fragrance to man's relatively poor sense of smell, and, as a matter of fact, the experiences of our noses with the plants is often an unhappy one. No



ARROW-LEAVED ASTER



WAVY-LEAVED ASTER



WEDGE-LEAVED ASTER



GRASS-LEAVED
GOLDENROD



ZIG-ZAG GOLDENROD



WHITE GOLDENROD



WREATH GOLDENROD

music, such as that which comes to our ears from wind in the pines or from migrating geese, comes from the goldenrods and asters. Few goldenrods or asters have anything so gentle to the touch as do bursting milkweed pods or the pelts of our fur-bearing animals. It is, then, through our eyes that these plants appeal to our esthetic sense.

There is little doubt that happiness is one of the most important goals sought by man, and that the beauty of our goldenrods and asters can contribute to human happiness. Next in importance, possibly, is health and the plants have some significance here.

The genus to which the goldenrods belong is *Solidago*. This name is derived from the Greek meaning to make whole, or to unite firmly. It was used in connection with the plant because of a supposed medicinal value in hastening the healing of wounds and the growing together of severed or cut pieces of flesh. Unfortunately for this idea, modern medicine apparently does not recognize any particular merit of goldenrods in this connection, and so it is interesting to us only academically and historically.

While relatively few persons even know of this supposed medicinal value of these common plants, there are plenty who have heard that goldenrod has a definite relationship to the incidence of hay fever. Some of the best statistics we have on the matter, however, tell us that only about one percent of the pollen in the air in late summer comes from goldenrod; at least this is true for one locality from which people take expensive trips to escape hay fever discomfort. While hay fever can be caused by the pollen of goldenrod, most infection comes from the pollens of ragweeds, which take to the air at about the time the goldenrods begin to bloom. The ragweeds are relatively inconspicuous, so the blame falls too readily on the showy goldenrod. One authentic reference to this story states that it is probably "safe to say that nearly all hay fever in late summer in the East is due to plants other than goldenrod." Most hay fever patients who are affected by ragweed would probably be similarly affected by goldenrod, but the abundance of goldenrod pollen is much less than that of ragweed and similar pollens. It is true that the average hay fever patient probably may be induced to sneeze if the heads of flowers are shaken before his nose.

There seems to be little structural differences in the pollen of different species of goldenrod, but it is recognized that probably the two worst species so far as hay fever is concerned are the noble or showy goldenrod, *Solidago speciosa*, and the seaside goldenrod, *Solidago sempervirens*. The latter is not found far from salt water coast lines, but the former, which is one of the most beautiful of all goldenrods, is found from Massachusetts to Minnesota and south to North Carolina and Arkansas.

Other associations of these plants are suggested in the chart section, which deals with different species.

The health of cattle is sometimes impaired by some goldenrods and asters. For example, *Aster adsensens* and *Aster commutatus* are reported to absorb selenium from the



LATE GOLDENROD



CROOKED-STEMMED
ASTER



LARGE-LEAVED ASTER



HEATH ASTER

Nature Magazine



CANADA GOLDENROD



NEW ENGLAND ASTER

important nectar-producers in Iowa. A New England writer claims that goldenrod is the most important plant to bee culturists. Eleven species of goldenrod are rated high in honey production in the vicinity of Ottawa, Canada. Among the asters discussed in the insert *A. gigantea*, *A. novaeangliae*, *A. cordifolius*, *A. sagittifolius*, *A. ericoides* and *A. acuminatus* are recognized honey producers. Some of these are valuable because they provide forage for bees at times of the year when other sources of pollen and nectar are not available. Others are valuable because of the great volume of food they produce in a small area. This reduces the amount of work a bee must do to make a suitable harvest, and, of course, this increases production. Of the asters listed above the heath aster, *Aster ericoides*, is so valuable as bee forage that bee keepers may cultivate it as a crop for the use of their bees. Some idea of the volume of nectar produced by these plants may be found in reference to the heart-leaved aster, *Aster cordifolius*. One Canadian report indicates that in one eleven-day period in September, three hundred colonies of bees produced twelve thousand pounds of honey when this species was obviously the primary source of supply. This aster is not attractive

soil in sufficient quantities to poison cattle that feed on the plants. As a rule, goldenrods and asters provide such poor forage that they are neglected by cattle when other plants are available.

On some occasions man has used these plants as a source of food. The leaves of the large-leaved aster, *Aster macrophyllus*, have been used as pot herbs, but unless they are taken when young they are inclined to be too leathery and tough to be considered as even approaching rating as a delicacy. The Indians of New Mexico and Arizona are reported to have used *Solidago missouriensis* as a salad. A drink is sometimes brewed from the sweet-scented goldenrod, *Solidago odora*.

There is no doubt but that the closest association these plants have with man's food supply is through their relation to honey production. The numbers of species that are important in this regard varies across the country, and according to the authorities. At least nine goldenrods are considered

to the eye, but it obviously has a great appeal to the bee's sense of smell.

The honey produced by various goldenrods and asters varies in quality as well as in quantity. The chart section should give the details on this, but some of the finest-flavored and most attractive honey comes from these plants. The hairy goldenrod, *Solidago rugosa*, which may be locally abundant may sometimes produce a nectar that results in a sour-tasting honey. Sometimes this odor is so strong that it may be detected in hives some distance away. However, the same plant may produce good honey as well.

Possibly the important thing in connection with the honey production of these plants is that the plants of greatest importance frequently grow in almost pure stands. Others are of importance because of their off-season flowering. The value of some, of course, is affected by the quality of the resultant honey. A colony of bees close to a good

stand of goldenrod may well yield from fifty to eighty pounds of good-quality honey of excellent flavor and fragrance and a gleaming white or amber color. Pammel of Iowa listed *Solidago gigantea*, *S. canadensis* and *S. graminifolia* as being among the best of the honey-producing goldenrods. On these we have given special help in the chart section.

During World War II there was a great possibility that the Allies would be cut off by the Japanese from their southeastern Asia rubber supply. A desperate effort was made to find alternative sources of supply. Thomas Edison, the wizard of science, gave great attention to this. Some twenty-four species of goldenrods growing naturally in the eastern United States were considered as possibilities because of basic materials found in their leaves. Of these only two were considered as having commercial possibilities. Of these the only species given real consideration was *Solidago leavenworthii*. Great hopes were held for this goldenrod, discussed in detail in the *United States Journal of Agricultural Research*, vol. 47, pages 149-153, 1933. However, the chemists, through their production of synthetic rubber, offered competition that the goldenrod (continued on page 368)



HEART-LEAVED ASTER



SMOOTH ASTER

COMMON NAME SCIENTIFIC NAME	RAGGED GOLDENROD <i>Solidago squarrosa</i>	WREATH GOLDENROD <i>Solidago ceasia</i>	ZIG-ZAG GOLDENROD <i>Solidago flexicaulis</i>	WHITE GOLDENROD <i>Solidago bicolor</i>
DESCRIPTION	Stem to 5 feet high, stout, hairy above or smooth, branched or unbranched. Roots fibrous. Leaves from base to tip of stem progressively shorter, with upper entire, or nearly so, and pointed, and the lower to 10 inches long and 3 inches wide, with sharply toothed margins, widest near tip, smooth or nearly so.	Stems to 3 feet high, branched or unbranched, bluish to purple and usually with a bloom that rubs off easily; round in cross section. Short, stout, underground system with numerous fibrous roots. Leaves stalkless, sharply toothed, narrowed at base, smooth or slightly hairy, 5 inches long and to 1½-inch wide. Lower shed by flowering time.	Stem to 3 feet high, branched or unbranched, angled, zig-zag, smooth or nearly so, particularly below. Leaves, thin, long-pointed at tip, strongly and sharply saw-toothed, abruptly narrowed at base, to 6 inches long and to 2½ inches wide, smooth or slightly fuzzy beneath, lower shed by flowering time and smaller.	Stem to 4 feet high, branched or unbranched, stout, usually erect and relatively stiff, fuzzy or smooth. Underground parts stout branching rootstocks with many fibrous roots. Leaves to 4 inches long and 2 inches wide, with long margined petioles, but the upper without petioles, and smaller and narrower. Somewhat fuzzy.
RANGE AND RELATIONSHIP	Found in woodlands where the soil is rocky and usually poor, and in hilly regions. Found from New Brunswick to Ontario in Canada and south to North Carolina, Ohio and Indiana and in the Catskill region to elevations of at least 2000 feet. Rather uncommon in southern part of range.	Family Compositae. Subfamily Virgauraeae. Found in rich, relatively open woodlands of hardwood species, or in shady glens or woodland borders from Nova Scotia to Ontario and Minnesota and south to Florida, Arkansas, Oklahoma and Texas in varying degrees of abundance through range but often abundant where established.	Family Compositae. Subfamily Virgauraeae. Found in rich woodlands, in moist, shaded, hilly areas from Nova Scotia to New Brunswick and Minnesota and south along highlands to Georgia, Tennessee and Missouri, and to elevations of 2300 feet in Catskills. Most abundant in northern areas. Also called broad-leaved goldenrod.	Family Compositae. Subfamily Virgauraeae. Found in dry soil, usually in shade and commonly in hilly country from Prince Edward Island to Georgia and less abundantly west to Tennessee and Minnesota. It rarely forms dense stands of the one species and often appears as isolated plants. Also called silverrod.
REPRODUCTION	Flowers in heads of 15-25 flowers, of which 10-16 may be ray flowers, which are to ¼-inch long. Heads to ½-inch high, numerous and borne in short clusters in upper areas of stem. The involucre at the base of the heads has bracts with tips that spread widely at right angles, giving ragged appearance. Fruits smooth.	Flowers borne in small heads in small clusters along the stem at the axils of the leaves, or often more crowded near tip of stem. The involucre at the base of the heads has the bracts not spreading at the tips as in ragged goldenrod and are usually under 1/5-inch long. Fruits are rather heavily hairy. Also called blue-stemmed and woodland goldenrod.	Flowers in heads of 3-4 rays and more disc flowers. Heads borne in short clusters in axils of leaves and each to ¼-inch high with an enclosing involucre at base that is smooth and with overlapping bracts. Flowers yellow. Fruits fuzzy, with the hairs short. Sometimes heads appear in a compact panicle at end of stem.	Flowers are in heads that are usually crowded into a terminal cluster that is somewhat like a compact cylinder. Heads small with involucre usually under 1/5-inch long. Rays white, yellow or straw-colored, fewer than disc flowers. Bracts of involucre whitish, blunt with widened mid-veins. Fruits smooth.
ECOLOGY	Flowers appear over relatively long period from August through October. The species does well in open wooded areas, or at or near edges of woodlands. It does not commonly form extensive pure stands of the one species, but may be reasonably abundant where well established. It is hardly beautiful, but is an interesting species.	Flowers appear in full bloom from August through October, the yellow of the blooms being replaced by the whiteness of the fruits towards the end of the flowering season. Lower leaves usually die off before flowering begins. While it often appears in relatively pure stands in small areas, it is not important to bees.	Flowers appear in late summer usually from mid-July through September. This species does not long survive removal of shade and water, and does not normally form extensive pure stands of the one species as do many of the related goldenrods. Does not make attractive bouquets, but has a beauty of its own in natural setting.	Flowers appear from August through October, but are only rarely conspicuous when compared with those of other goldenrods. To some this goldenrod may appear to be a sickly goldenrod, but it has its favorable points, too, in the fact that few other goldenrods are not golden and most have a less stiff erect over-all form.
ECONOMY	It is not listed by beekeepers as an important forage for honey bees, due in part, probably, because it does not appear in dense pure stands where bees may quickly harvest nectar and pollen in connection with their food-gathering. It probably has no significance in hay fever or in medicine. Also called stout goldenrod.	One of the most beautiful of woodland goldenrods with no apparent record as a contributor to hay fever. Its sole claim to fame apparently lies in its unique beauty, and the term unique is used here without reservation, or with fear of effective criticism. A bank of this goldenrod in a patch of sun through autumn colored leaves!	Sheds an insignificant amount of pollen and cannot be considered a hay fever factor ordinarily, and is not listed as an important forage for bees. Because of spreading underground parts and hillside habitat might be considered as important at times in anchoring soil that might otherwise erode too readily. Has some cover value.	The amount of pollen produced is insignificant so far as the individual plant is concerned and because the plants rarely form extensive masses. The plant can hardly be considered to make any contribution to the hay fever situation or to the honey-producing record of visiting honeybees. Known as bellyache weed.

HAIRY GOLDENROD <i>Solidago rugosa</i>	GRAY GOLDENROD <i>Solidago nemoralis</i>	CANADA GOLDENROD <i>Solidago canadensis</i>	LATE GOLDENROD <i>Solidago gigantea</i>	GRASS-LEAVED GOLDENROD <i>Solidago graminifolia</i>
Stem to over 7½ feet high, stout, branched or unbranched, finely hairy or rarely smooth, arising from long, creeping, underground rhizomes which may form an underground mat. Leaves roughly hairy and harsh to touch, to 4 inches long and to 1½ inches wide, roughly veined on lower side, toothed conspicuously, pointed or tapering to point.	Stem to 2 feet high, erect or sometimes prostrate or nearly so, covered with dense, ashy-white short fuzz. Underground branching rootstocks and fibrous roots. Leaves thick, rough, fuzzy like the stems, the lower blunt tipped and broader near tip, weakly 3-nerved, more or less toothed on margins with tooth curved.	Stems to over 6 feet high, erect, stiff and brittle, at least in upper areas appears to be mealy. Underground portions are extensively creeping, interlocking rhizomes. Leaves to 10 inches long and nearly 1 inch wide, 3-nerved, the lower ones dying by flowering time. Smooth or rough above with toothed or untoothed margins.	Stem to 8 feet high, smooth, with a bloom that rubs off, stout, branched near the top. Underground parts represented by long creeping rhizomes with fibrous roots. Leaves thin or thickened, 3-nerved, with sharply toothed margins, smooth on both sides or fuzzy beneath, to 6 inches long and to 1¼ inches wide, the lower petioled.	Stems to 4 feet high profusely branched in the upper areas into a more or less flat-topped formation. Underground structures are creeping rhizomes that are branched. Leaves, abundant, to 5 inches long and to 1/3-inch wide, 3-5 nerved, roughly fuzzy on margins and nerves of lower surface. Lower leaves die and fall off early.
Family Compositae. Subfamily Virgaurea. Found on dry rolling hillsides, or in abundance along roadsides, usually in sun but not necessarily so. Ranges from Newfoundland to western Ontario and south to Florida and Texas. A variety, <i>S. spagnophila</i> , grows at best near bogs and wet shorelines. Also tall, rough or pyramid.	Family Compositae. Subfamily Virgaurea. Dry soil, particularly in sandy areas such as may be found in open fields exposed to the sun. Ranges from Nova Scotia to Saskatchewan and south to Florida, Texas and Arizona. In some areas it may be an important part of the flora. Found into Mexico. Also called field or dwarf goldenrod, or Dyer's weed.	Family Compositae. Subfamily Virgaurea. Ranges over open, sunny, moist soil, or even over dry fields, forming extensive pure stands. Ranges from Newfoundland to Minnesota and south to North Carolina and Tennessee. Its adaptability to wet or dry, shady or sunny areas has given it a wide local and general range.	Family Compositae. Subfamily Virgaurea. Favors open moist soil and found from New Brunswick to British Columbia and south to Georgia, Texas and Utah and southern Oregon. In Virginia, is found in mountains up to elevations of 2300 feet. May be most conspicuous plant in a late summer pasture within range.	Family Compositae. Subfamily Euthamia. Usually found on moist soil of fields and roadsides well exposed to sun where relatively pure stands may sometimes be formed. Ranges from New Brunswick to Saskatchewan and Alberta and south to Florida, Nebraska, Wyoming and New Mexico, particularly in mountains in southern areas.
Heads are to 1/6-inch high and are borne usually on one side of spreading recurved upper branches. The ray flowers are small and to 11 in a head. The bracts of the involucre are slender, blunt, overlapping. The fruits are covered with short, persistent hairs. The whole flower-bearing area is usually a panicle.	Flowers borne in heads that are to ¼-inch high and more or less crowded on one side of recurving branches from the upper part of the stem, the clusters appearing as one-sided panicles. Rays 5-9 and more numerous than disc flowers. Bracts of involucre oblong and slender. Fruits fuzzy.	Flowers in heads borne in terminal clusters that are crowded on recurved, one-sided branches that form a panicle. Rays in each head number 7-17. The involucre is to 1/8-inch high with bracts in several series, uniform, slender, pointed and yellowish with definite green tips. Fruits short-hairy or smooth.	Flowers yellow, borne in heads that are ¼-inch high and crowded on spreading recurved branches clustered at end of stem the branches appearing powdered often. Ray flowers 7-15, relatively large and surrounded by involucre whose bracts are fine, thin and oblong. Fruits are finely fuzzy.	Flowers in small narrow heads to 1/6 inches long, forming flat-topped appearance. Each head may contain from 12-20 ray flowers and from 8-12 central disc flowers. The supporting involucre is composed of yellowish, oblong, slightly sticky bracts usually without any conspicuously different tips. Fruits with short hairs. Called bushy, fragrant flat-topped goldenrod.
Flowering time is from July through November. Chromosome number is 18. In some areas, this species may form pure stands and may crowd out most other flowering plants. Because of this it is considered a weed, particularly as the plants have little or no forage value to cattle. Late, shallow plowing followed by crops controls.	Flowers appear from July through November, and sometimes on well into December, depending on the season and, of course, the locality, making the species one of the longer-seasoned forms. It may be well represented in an area but not usually forming such dense formations as Canada goldenrod and some others.	Flowers appear in late summer from August through October. Dense, tall, pure stands eliminate almost all competing plants but form an ideal cover for wildlife, even though little food may be present. The spreading root systems provide a superior soil anchorage that resists destructive erosion, which might be undesirable.	Flowers from late August through October, being most conspicuous in late season. In some areas it may be in flower as early as July. The plant appears to be rigid and stiff and the stems break relatively sharply. Lower branches of the flower-bearing top are the longer.	Flowers appear from July through September, making it a relatively early-flowering species. The relatively dense stems above ground provide good shelter but little food for wildlife, and the profusely branched underground parts provide good soil anchorage to check undesirable erosion. Of little or no forage value to livestock.
The species has some slight importance as a cause of hay fever, and the pure stands may provide abundant forage for bees. However, honey formed from the nectar may have a sour taste and even a sour smell, although this is not always necessarily so. Those who know can recognize this honey at a considerable distance.	Pellet in his book on honey-producing plants rates this species as one of high production of nectar, and therefore of great importance to industries dependent on honey production. Long flowering season adds to this value obviously. The reason for the common name Dyer's weed is obscure.	Pammel says that the species produces an abundance of nectar and one record from Louisiana shows that bees foraging on the species may produce 40 to 50 pounds of good honey per colony. Shallow plowing destroys stands where the plant is a weed, particularly if a cultivated crop is used for following year.	May sometimes be considered a weed in pasture land since forage value is low, but may be controlled easily by shallow late plowing followed by cultivated crops. Pammel lists the species as a valuable nectar producer, of value because of this to bees and, of course, through them to the honey industry.	Pammel lists the species as a good nectar producer for honey bees. Other authorities list it as an undesirable weed that easily may be controlled by shallow fall plowing followed by cultivated crops the next year. It has an interesting fragrance, is not listed as a hay fever species. Leaves may bear resinous spots.

COMMON NAME SCIENTIFIC NAME	LARGE-LEAVED ASTER <i>Aster macrophyllus</i>	NEW ENGLAND ASTER <i>Aster novaeangliae</i>	WAVY-LEAVED ASTER <i>Aster undulatus</i>	HEART-LEAVED ASTER <i>Aster cordifolius</i>
DESCRIPTION	Stems to 3 feet high, reddish, rather conspicuously angled, rough. Underground portions are long, thick, creeping rootstocks. Leaves to 9 inches long and 7 inches wide, forming large colonies of 3 to 4 per stem before flowering top appears; thick, firm with narrow petiole and broad blade, the upper with broadly winged petioles.	Stems to 8 feet high, stout, heavily leafy, usually well-branched above and with a sticky fuzz over most surfaces. Underground parts short thick rhizome with many fibrous roots. Leaves to 5 inches long and 1 inch wide, entire margined, fuzzy and soft hairy beneath with bases that usually clasp the stem. Lower shed early.	Stems to 5 feet high, stiff, rough, bushy above and covered with a pale fuzz. Flowers borne in an open formation. Leaves with heart-shaped bases, which surround stem, contract abruptly and then widen, with the margin distinctly waved. Blades relatively rigid and dark green. Plant has a generally rugged appearance.	Stems to 5 feet high, smooth or rarely sparsely fuzzy, branched above. Underground parts are represented by short rather thick rhizomes that creep and bear many fibrous roots. Leaves with heart-shaped blades, to 5 inches long, deep-toothed margins, thin, rough, fuzzy, with scattered hairs and short petioles in lower areas.
RANGE AND RELATIONSHIP	Family Compositae. Subfamily Biotia. Common in open woodlands on moderately dry shady soil, particularly in hilly country. Ranges from New Brunswick to Minnesota and south to North Carolina. At least 6 varieties recognized in the eastern part of the range. In spite of beauty is not listed as having been cultivated.	Family Compositae. Subfamily Euaster. Fields and swampy borders often forming great mats, or almost pure stands along roadsides and fence-rows. May also be found under cultivation in gardens. Ranges naturally from Quebec to Saskatchewan and south to South Carolina, Alabama, Kansas and Colorado. Chromosomes number 10.	Family Compositae. Subfamily Euaster. A relatively common plant of dry, shaded roadsides and open woodlands. Ranges from New Brunswick through Ontario to Minnesota and south to Florida, Georgia, Mississippi, and Texas. Plants are usually not crowded with others of their kind.	Family Compositae. Subfamily Euaster. Found at best in woodlands that are open and in mixed thickets. Ranges from Nova Scotia through New Brunswick and Ontario and Minnesota and south to Georgia and Missouri. Locally it may be found in great abundance, although it is not so conspicuous as many other related species. Also called blue weed aster and bee weed.
REPRODUCTION	Flowers in heads to $\frac{1}{2}$ -inch high. Ray flowers about 16 each to $\frac{1}{2}$ -inch long, usually lavender, violet or pale bluish. Bracts of the involucre varying from blunt greenish, fuzzy outer series to slender inner ones that may have rosy margins. Generally the bracts are in 3 series.	Flowers in heads to 2 inches across at the branch ends, forming great hemispherical clusters. Ray flowers from 20 to 100, narrow, to $\frac{3}{4}$ -inch long, violet, rose, red, white, or, more commonly, deep purple, but always attractive. Bracts of involucre unequal, green, spreading, often sticky. Fruits fuzzy and with reddish-white parachute.	Flowers borne in heads that are to $\frac{1}{3}$ -inch broad and are rather crowded on the upper branches. Ray flowers 10-20 and light violet to blue. Heads supported below by involucre that is narrow at base and composed of fuzzy, sometimes straw-like, bracts that are in 3-4 series and have spreading short green tips.	Flowers borne in heads that are numerous and small, each being to $\frac{1}{8}$ -inch high and to $\frac{2}{5}$ -inch broad. Ray flowers number 10-20, may be to $\frac{1}{3}$ -inch long and are violet, blue or white. The great abundance of heads makes up for their smallness in making plant attractive. Involucre bracts are tipped with short green points.
ECOLOGY	Flowering period extends from August through September, being at best earlier in the season. Plants may appear in considerable colonies, the great leaves sometimes forming an almost continuous cover of the forest floor. Leaves may be conspicuous long before the plant has a superficial resemblance to the flowering aster.	Flowering period from July through October, but under cultivation may be found flowering outside this period. May have a distinctive turpentine scent, which may be detected by walking through a mass of the plants. Under management practices the underground parts are separated every 2 to 3 years for best results.	Flowering time is from September through October, so it is a relatively short-season species. In spite of its beauty it does not seem to have attracted the attention of those who cultivate wild flowers and is not listed by many in lists of cultivated plants. Possibly its leaves with unusual margins may appeal to some.	Flowering time extends from August through October, with flowers in great profusion in middle of season. At least two eastern varieties and number of cultivated varieties. Listed by Bailey and others as a cultivated species and this is undoubtedly justified recognition for beauty, but other values exist as well.
ECONOMY	A popular plant with many Nature lovers, but the flowers are not attractive as bouquets. No reference available as to role in honey production so probably is not important in that connection. Leaves have been used as potherbs in Maine and Quebec, but with age they become brown and tough and unsuitable for such use as food.	Not listed as a hay fever factor by any authorities, and neither Pellett or Pammel consider it as important in connection with honey production or honeybee prosperity. Dense plants may provide good cover for wildlife but no food to these forms. Root system may provide excellent soil anchorage preventing erosion.	This species is not listed among the asters that have value as sources of food for honey bees, or is it listed in those species that are a factor in hay fever. These things may be due to the fact that there is a short season and the species does not grow in crowded colonies as is the case with most nectar-pollen sources.	Not listed as a factor in hay fever but given great recognition as a nectar producer valuable to bees. One Canadian report attributes a harvest of 12,000 pounds of honey from 300 bee colonies over an 11-day period in September. The resultant honey is light amber in color and most pleasantly flavored. This value is great.

ARROW-LEAVED ASTER <i>Aster sagittifolius</i>	SMOOTH ASTER <i>Aster laevis</i>	HEATH ASTER <i>Aster ericoides</i>	CROOKED-STEMMED ASTER <i>Aster prenanthoides</i>	WEDGE-LEAVED ASTER <i>Aster acuminatus</i>
Stems stiff, erect to 4½ feet high with more or less upright branches that are smooth or in upper areas slightly fuzzy. Leaves olive-green, thin, sparingly but sharply toothed, broadly lance-shaped but the lower at least with arrow-like bases or heart-shaped bases. To 6 inches long, smooth, or rough beneath.	Stems to 4 feet high, stout, branched or unbranched, often covered with a bloom but appearing smooth. Underground parts short, stout, sometimes red rhizomes. Leaves to 4 inches long and to 2 inches wide, thick, entire or slightly irregular-margined, almost greasily smooth, upper bract-like; basal narrow with winged petiole.	Stems to 7 feet high, profuse branching above, smooth, stiff and slender in most parts. Underground parts with fibrous roots that branch freely. Leaves are narrow, linear, to 1 inch long, stiff and in upper areas are light green and relatively crowded, although smaller than the lower leaves. Also called Michaelmas daisy.	Stems to 3 feet high, profusely branched above with lines of fine hairs appearing in the upper areas. Sometimes becomes brownish. Leaves are conspicuously rough above but smooth beneath, to 6 inches long and to 3 inches wide, with the lower half represented by a winged petiole and the upper conspicuously widened.	Stems to 3 feet high, distinctly zig-zagged, conspicuously branched above, fuzzy, usually leafless in lower areas. Leaves to 6 inches long and to 1½ inches wide, broadly oblong, coarsely toothed margins, wedge-shaped at base and about 20 in number below the stem branching area. Veins rather conspicuous.
Family Compositae. Subfamily Euaster. A sparingly common plant found almost wholly on dry soil usually in the shade. Ranges from Maine to North Dakota and south to North Carolina, Alabama, Mississippi, Kentucky and Kansas. Often appears to be dusty and not fresh. Does not usually grow in dense colonies of one species.	Family Compositae. Subfamily Euaster. Found in dry soil, in open or in shade or at margins of wooded areas. Ranges from Maine to Ontario and Saskatchewan and south to Virginia, Missouri, Alabama, Louisiana and Colorado. Also found to some extent as a cultivated species in gardens and hothouses.	Family Compositae. Subfamily Euaster. Found for the most part in dry open fields and pasture lands. Ranges from Maine, south through New England and New York, New Jersey and Pennsylvania and Georgia and west through Ohio, Wisconsin, Kentucky and Texas. Often one of the commonest roadside asters over great areas.	Family Compositae. Subfamily Euaster. Found sparingly common in rich open woodlands and among other plants at edges of streams and waterways. Ranges naturally from New England west to Minnesota and south to Virginia, Kentucky and Iowa. It is essentially a northern species and is at best in northern parts.	Family Compositae. Subfamily Orthomeris. Commonest in moist woodlands and at edges of wooded areas. Ranges from Labrador to Ontario and south to Georgia and Tennessee. It is not the type to form dense pure stands, ordinarily, but may be reasonably abundant where it has become established. Also called whorled and mountain aster.
Flowers borne in heads that are to 4/5-inch across, with 10-15 ray flowers that are to 1/3-inch long, relatively inconspicuous light violet or pale purple. Heads are commonly crowded. Bracts of the involucre are slender, smooth or nearly so, and with spreading green tips, these being narrower than those of <i>A. cordifolius</i> .	Heads of flowers numerous, to 1 inch broad, with 15-30 ray flowers that are blue, violet or purple and each to 3/5-inch long. Bracts of enclosing involucre rigid, sharp, with green tips closely pressed and overlapping in several series. Fruits smooth or nearly so and with reddish or whitish hairy parachute. Chromosomes number 54.	Flowers borne in abundant small heads that are to ¼-inch high and often crowded along upper side of spreading wandlike branches. Heads may be 1/3-inch across. Ray flowers are white or rarely purplish and are enclosed below in bell-shaped involucre whose bracts are nearly equal and with pointed green tips. Disc flowers yellow.	Flowers borne in heads that are to 1 inch across with 20-30 ray flowers that are pale blue to violet or lilac and to ½-inch long. Supporting involucre is hemispherical and composed of bracts that are in 3-4 series, slender, overlapping with the outer shorter, with spreading green tips. Fruit fuzzy.	Flowers in heads that are to 1½ inches broad. Ray flowers 12-18 and each to 2/3-inch long, usually white or purple. Involucre forms a hemispherical cup that is to 1/3-inch high and is composed of bracts whose tips are drawn out into points. Fruits are glandular and fuzzy, with soft, firm, nearly white parachutes.
Flowering period from August through October, and sometimes persisting after frost has killed most other species. An Iowa record shows bees feeding on the plant well into November, when other sources of supply had been killed. It probably is ordinarily inferior to the better known honey producers.	Flowering period from September through October in wild, but under cultivation may have flowering period extended or controlled. This species is relatively common under cultivation in some tropical gardens. Cultivation is due to beauty of the plant, not to its value as nectar producer.	Flowering period is from August through November, being one of the long-flowering periods for asters. It is listed by Bailey and others as a cultivated species and may have extended flowering period under managed conditions. A western variety has larger flowers and heads than those described above.	Flowering period from August through October. It is rarely abundant, not too conspicuous but certainly not unattractive when in its prime. We find no reference indicating that it has been under cultivation and it is doubtful if it is sufficiently abundant to be important in soil erosion control.	Flowering period is from July or June through October, making it a long-flowering species. An enormous form is to be found in New York and New England in which the flowers turn into conspicuous tufts of chaffy materials on or after maturity. It is not listed as having been under cultivation, although it has a unique beauty.
There is little reason to associate this plant with soil erosion, hay fever or any major role in honey production. Neither is it ordinarily an attractive flower when growing in its natural habitat. Its primary interest probably lies with botanists who are interested in finding different species.	Not listed by honey producers as important source of nectar, or is it associated with hay fever. Possibly if it were more rare its beauty would be more genuinely appreciated, but its commonness makes it less appreciated. Probably of no food value to wildlife and of comparatively little cover value. Helps control erosion.	So valuable as a producer of nectar and pollen useful to bees that the plants are sometimes cultivated by beekeepers to help in this. Bees have been noted to feed on this aster in preference to white clover, which is normally a great favorite. Is particularly popular as a nectar producer in Missouri and the middle-West.	No reference seems to be made in literature of any significance in hay fever matters, or is it listed as a plant making any contribution to honey production. The shape of its leaves makes it attractive to those interested in finding new species, and while it may seem to be just another aster it is attractive just the same.	Pammel and Pellet consider the species as important as a source of food for honey bees and in the general production of honey. This may be due in part to the long-flowering season rather than to any great production of flowers over a shorter period. It has some little value as cover for wildlife and undoubtedly some little erosion-control value.

(Continued from page 363)

source was not able to meet. Potentially goldenrod might have taken a prominent place in the economic and military history of our country.

These plants have and will play an important but hardly spectacular part in what goes on about us. Almost all of the goldenrods and asters are perennial plants, with branching, well-developed underground parts. Many of them grow profusely in poor soil or hillsides. These soils might easily be eroded and lost were it not for the binding qualities of the underground parts of these plants. This alone should justify our interest, in addition to the food, rubber, and esthetic aspects already suggested. The soils that are commonly favored by these plants are rich soils, with an acidity of approximately pH 5-6.

To most farmers these plants may be considered as weeds because of their low value as forage plants. However, they may usually be kept under control by shallow plowing in the autumn, following, the next year, with a cultivated crop.

Where the plants are grown for their beauty or in order to help the bees, the common practice is to plant underground parts. When grown in flower gardens it is a common practice to dig up and separate these parts every few years.

The dried tops of goldenrods and asters may burn easily. This is recognized by campers, who frequently use the tops as tinder to start their fires. However, this inflammable quality carries with it a threat, and fall fires may get out of control and result in considerable damage.

In connection with the management of wildlife, goldenrods and asters probably contribute nothing to the food supply. They do provide valuable and effective cover for many birds and mammals, making it well nigh impossible for heavy hunting practices completely to destroy a population.

Both goldenrods and asters offer a decided appeal to the botanists. The differences are frequently small, and a few species hybridize, producing plants whose ancestry is difficult to recognize. There are some one hundred thirty species of goldenrod, of which about sixty are to be found in the eastern United States, thirty

in the western part of the country and the remaining ones in Mexico, South America, Europe and northern Asia. There are about two hundred fifty species of asters, most of which are North American. A few of these find cultivation foisted on them. The Mojave aster, *A. abatus*, is grown as an ornamental because of its silvery foliage. *Aster arenosus* and *Aster tanacetifolius* have been cultivated by the Hopi Indians for use as medicine. Devilweed of Mexico, *A. spinosus*, is recognized in some places as a troublesome weed, but it can grow in saline soils and it is frequently found under semi-cultivation for use as a soil anchor where such saline soils are found. Horticulturists, of course, have produced garden varieties of asters that are too numerous to mention in a general treatment such as is possible here.

According to the botanists the goldenrods and asters belong to the Family Compositae. This family includes the sunflowers, daisies, ragweeds, dandelions, thistles, lettuces, and a host of other common plants. In all of these the flowers are clustered into heads that are usually enclosed at the base by an involucre of green bracts. The flowers themselves may be in the form of tubes, or they may be "strap" shaped. Commonly the strap-shaped flowers are around the edge of the heads, appearing as rays. In the goldenrods these rays are almost invariably yellow. In the asters they may be white, pink, blue, purple, or reddish. The leaves of both goldenrods and asters are alternate. Goldenrod heads normally have less than sixteen rays while asters almost invariably have many more than this. Commonly the ray flowers bear pistils and no stamens, while the other flowers, the disc flowers, bear both stamens and pistils.

In some of the members of the Compositae, such as the dandelion, the pollen is sterile and no true fertilization takes place even though the flowers may be visited by insects that transfer pollen. In the goldenrods and asters, insects of many kinds and particularly bees, flies, beetles and butterflies may assist in pollination.

When we look at these plants from all of these angles we realize that they are worth knowing better. They are misunderstood in spite of the fact that there are few places in the United States where they are not to be found. Possibly this article will help correct this misunderstanding.



SEPTEMBER

*They lassoed summer in the fields today,
There were wheels all over and they baled the hay
And stole the evening primrose from the morning light,
But Summer has a flock of wings and some of them took flight.
Summer has a lot of feet and some of them escaped,
Some of them were quick to take a meadow mouse shape,
And some of summer got away in patent leather style,
Cricket-legged the summer leaped down the cut-grass aisle.*

Elizabeth Jane Astley

Olympic Park Viewpoints

In the issue of Nature Magazine for January, 1956, we carried an editorial entitled "Latest Olympic Attack." It took exception to a program proposed by Roderic Olzendam and Associates, counselors in industrial and public relations, of Tacoma, Washington, to transfer about one-third of Olympic National Park to the U.S. Forest Service and thus make the trees on these lands available for commercial cutting. Mr. Olzendam did not, of course, like our comments, and asked for an opportunity to reply. He does so herewith in a letter, which we publish side by side with our own further comment.

Mr. Olzendam says:

THE MAIN purpose of our Program of Public Information is to help the individual owner of the Olympic National Park and the Olympic National Forest (and every American is an owner) to understand just how his property is being managed for him. As one of the owners myself, and having ten children and grandchildren-owners, I want the facts both ways. I get only one point of view from your editorial.

Once the individual American has the facts, we are convinced he is fully capable of making up his own mind as to whether he is getting all the recreational and financial returns possible. My question is this: Does every owner of the Olympic National Forest and the Olympic National Park know whether or not he is getting the proper returns from the 621,796 acres he and his fellow Americans own in the Olympic National Forest, and from the 903,000 acres they own in the Olympic National Park? We think 95% of the people don't know.

A large proportion of the material in the January, 1956, issue of your publication is devoted to birds, animals, shrimp, and fish. I too like birds and animals and enjoy eating shrimp, salmon and trout. I am as anxious as you to make sure nothing happens to them.

There are very few birds in the virgin forests of the Olympic, or in any other virgin forests.

The great tree columns stand silent and lonely, listening in vain for the Evensong of a hermit thrush or the Te Deum of a friendly song sparrow. These birds are not worshipping in the great cathedral of the old trees, but are happily singing in the chapels of the new trees springing up everywhere on Tree Farms and under the sustained yield management of the United States Forest Service. Birds and animals, like man himself, enjoy the sunny open spaces. As for elk, deer, and bear, they too find little to eat among the big trees.

The elk and deer are multiplying rapidly, not in virgin forests, but in those areas where scientific harvesting of timber has taken place.

Proper timber harvesting benefits the game by providing fresh new forage necessary for survival. If it were not for the scientific harvesting of the trees on the private, state, and national areas surrounding the Park, the elk and the other wild animals that roam this region, would find it difficult to go on living. There just wouldn't be food enough to go around. So, we too want to see wild life get a break.

In our opinion:

OLYMPIC National Park was set aside to preserve forever an extraordinary scenic wilderness, a rain-forest of great trees and a unique wildlife population. After thorough consideration Congress authorized for the park a maximum acreage of 898,292 acres. It now comprises an area slightly under that approved figure, its boundaries having been rounded out carefully and properly to include assets that make it indisputably worthy of a place in our national heritage of national parks.

Within Olympic National Park there are, naturally,



Is there a choice between rain forest and this? Land logged for Rayonier, Inc., along boundary of Olympic National Park. Photographed in April, 1956

stands of trees that, to some, are regarded only as merchantable timber. Such a view discounts human values, considered over a long term, in favor of the short term significance of harvestable trees. So, in recent years, there have been several proposals for the dismemberment of the park, all rejected by Congress and by successive Secretaries of the Interior. Mr. Olzendam's proposal is only the latest of these. There is nothing really new about it for it refurbishes the previous plans, polishes up the old and specious arguments, and attracts

We are in complete agreement with you, Mr. Westwood, that we should maintain our national parks, once the boundaries have been properly set. The boundaries of the Olympic National Park were never scientifically set. They follow section lines, whereas they should follow contour lines for the protection of watersheds and recreational values.

We believe the American people as a whole would be perfectly willing to abide by a decision on the boundaries if Congress should ask that a review be made by the Secretary of Agriculture and the Secretary of the Interior. Were Secretary of Agriculture Benson and the Secretary of the Interior to assign the job of finally settling the correct and scientific boundaries to the Superintendent of the Olympic National Forest and the Superintendent of the Olympic National Park, and their men, I am persuaded in my own mind that the answer would be sensible, agreeable, and final.

No one connected with our Program has proposed "carving up the Park." Our proposal is to transfer approximately 245,000 acres located on the fringes of the National Park to the United States Forest Service for management.

We do not propose to touch in any way the transcendent beauties of the Olympic National Park, neither the rain forests, nor the elk, nor the upland meadows, nor any of the matchless scenery or assets of this glorious region. Transfer 245,000 acres on the lower levels and around the edges of the Park to the Forest Service and there still will remain in the Park 658,000 acres comprising all the unique and magnificent beauty spots, including the rain forest Corridors of the Hoh and the Queets and all the territory adjacent to Crescent Lake as well as the recently added Ocean Strip.

We agree that an area upon which the timber has recently been harvested looks bad for a period of maybe eight or ten years. But, these so-called "ugly spots" become vital growing areas after ten years, brilliant with verdant new Douglas Fir forests reaching for the sun in all their youthful beauty and vigor. A slaughter house is not an awe inspiring scene of beauty nor is a field of stubble as beautiful as yellow corn waving in the Autumn breeze. No harvest is as pretty as the pre-harvest scene. But, as long as we eat meat and bread and wear shoes there will be slaughter houses and stubble fields. Our homes with polished floors, comfortable and attractive furniture, and our daily newspapers and favorite magazines, are the result of the timber harvest.

All monies from timber sales on Forest Service lands go into the Federal Treasury by law.

Under Federal law 25% of these revenues are returned by the Treasury to the counties from which the timber has been harvested. By law this money must be used by the County Commissioners for schools and roads.

An additional 10% is appropriated by law to the Forest Service for use in the maintenance of roads and trails within the area from which the timber is cut.

We have proposed that an additional 25% of the

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the support of those who cannot see the trees for the timber.

One of the arguments, iterated by Mr. Olzendam, takes exception to the boundaries, holding that they should "follow contour lines for the protection of watersheds and recreational values." This is one basis of boundary-making, but the most important consideration is what a boundary includes—or leaves out. Mr. Olzendam would not, he avers, "touch in any way the transcendent beauties of the Olympic National Park," except that he would leave out of its borders some 245,000 acres of merchantable timber. Two pictures in this column



Logging on land immediately contiguous to Olympic National Park, a Park boundary marker being on the tall tree at the left. Photographed in April, 1956

leave no doubt as to what this could do to the "transcendent beauty" of the park.

For all his protestations of appreciation of the park, Mr. Olzendam reveals himself as really unappreciative of the basic concept that animates our system of national parks. He is carried away by the idea that the elimination he proposes would release \$60 to \$80,000,000 of new wealth annually, although he avoids estimating how long this "new wealth" might endure. Of course, his devotion to the park is *after* it has surrendered to harvest the acreage of forest he wants available for cutting.

His solicitude for wildlife is touching. He would like to make available for hunting the wild game animals found on the excised acreage. They are today protected—including the famous herd of Roosevelt elk—within the park. The balance of nature within the area, as at present constituted, depends upon an extensive area. Wildlife protection would be ill-served by the dismemberment proposed.

Mr. Olzendam envisages greater recreational oppor-

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Lunette Barber, North Carolina's "grand young woman of wildlife education," who has the State "for her beat," briefs youngsters at the school camp on important fishes of the State.

Fifth-graders become conservationists at

Greensboro's Camp School

By CHARLOTTE HILTON GREEN

Photographs from N. C. Wildlife Resources Commission

SCHOOL in the out-of-doors! Classes held beside a running stream; while climbing about rocks; in woodland or in open field; during stops on a Nature trail; on the steps of a rustic cabin. Perhaps a "cook-out" for supper, followed by a camp fire and informal talks, learning first-hand something about the voices of the night and of the stars overhead.

Such a school was held for a week last October for five 5th grade classes of two Greensboro, N.C., schools. Lindley Jr. Elementary School, which pioneered in this type of conservation teaching, enjoyed its sixth year; Caesar Cone School its first. Several other schools in the State have had, or plan, similar camp schools.

What educational therapy there is in it all! After a week of such classes the 150 youngsters returned to their homes and schools tanned and healthy, with happy hearts, and minds filled with information and enthusiasm (and pockets and knapsacks with specimens) for the year's work ahead.

This Camp School was held in William B. Umstead State Park, between Raleigh and Durham, N.C. There are rustic cabins for the young campers, and large mess halls for administration, cooking, dining, and indoor projects for any inclement days. The park itself has a variety of topography and habitats.

Take 5th grade boys and girls, an experienced and enthusiastic outdoor-loving staff, a beautiful and interesting site and good and bounteous meals. Mix them

all together, and add "October's bright blue weather," and the children will learn more, and will remember it better, than in several weeks of school.

The staff was headed by two outstanding principals of the State's elementary schools—Miss Ethel McNairy of Lindley, adept at Nature and conservation teaching, and Mrs. Margaret Wall of Caesar Cone. With the five classes come their own grade teachers. There are also specialists from various State agencies and institutions of learning. Miss McNairy's dictum is: "If you cannot get an adequate staff, do not attempt a camp school."

Such a staff is available because each one is completely sold on the value of such a camp school week. So important does Dr. Hollis J. Rogers, assistant professor of biology at Greensboro Woman's College, consider the project that he goes himself to teach Nature trails, and brings several of his biology majors and two or three of his student teachers. Such an experience, he believes, rounds out a student teacher's training in natural sciences.

Dr. Rogers leads groups of children over the trail each day, and has the children help plan and develop such trails. His creed: "To interest a child in Nature and conservation, and any knowledge of the outdoors, *get him young.*" Pointing out that in the last few decades the nation's population has shifted from being 80 percent rural to less than 20 percent today, he believes the modern elementary school should have a natural area of an outdoors environment. He believes in a school



"Too much good topsoil has been washed into this pond," J. M. Dunlap tells his group, pointing out that check-dams would correct this situation.

Nature trail established to stimulate teachers to do some outdoors' teaching.

Sometimes interested people will give or lease an area for such a trail, as Dr. and Mrs. F. B. McNutt of Greensboro have done. Often civic groups will help to maintain them. Of course, to be effective such trails should be within easy commuting distance of the schools, should include a typical flora and fauna of the region, have a stream, pond, or lake, and enough signs to give clear directions and indicate interesting features.

Children with a background of several outdoor field trips and trail experiences will be ready for a camp-out school week by the time they reach the 5th grade. This is Miss McNairy's choice, although some schools prefer older grades. In the Greensboro schools much preliminary work is done in the 4th grades because, at the beginning of the fall term, the children will be 5th graders. Under guidance, the youngsters do much of the work of planning, all phases of it being integrated with their school work. They help plan menus, studying which foods are best to build bone, good blood, or protect teeth. Even arithmetic receives a new impetus as they study costs of foods and other supplies, transportation, number of cars needed, and so on. "Now I see some sense in arithmetic," was the earnest comment of one child.

At the Greensboro school camp the cost is \$12.50 for the six-day week, the cost borne by the child's parents. However, the school principals see that no child is left out because of inability to pay. Children are encouraged to earn all or part of the cost in various ways—baby-sitting, yard work, dishwashing, paper routes, running errands. Too, interested individuals, or civic groups, or both, often pay part of the costs of such camps.

At camp the children share in the work, different

groups taking their turn at K.P. They sing, have Nature quizzes and a generally gay time while doing dishes; they keep their own cabins and the grounds tidy. Never have I seen such clean camp grounds and trails. Good citizenship is stressed each morning when cabin groups meet to discuss plans and straighten out any problems with their grade teachers. Each group of 16 has its own captain, elected by the children. At the start of all trips there is a roll call. The teachers keep a record so it is known where each child is at any given time. No child is allowed to fish or swim without the parent's signed permission, and lifeguards keep close watch during these activities. There is always a nurse at camp. Part of the preparation for a school camp is that each child must not only know safety-first rules but must abide by them.



Margaret Wall, principal of Caesar Cone School, leads a group of young geologists on a rocks and minerals field trip.

Stunters would be packed right back to regular school, and no child is going to risk *that*.

Of course, there are occasional rainy days when classes must be held indoors, and alternate programs and materials are arranged in advance. There are slides and movie projectors, Nature shorts, charts, maps and an adequate Nature library. The children do not need to be urged to look up things seen on field trips, or about which they are curious. The small library shows use—but not abuse.

The meals I found wonderful; from their appetites, so did the children. The Lindley School group brought two colored cooks, but for the Caesar Cone group—where finances have to be watched a bit more carefully—

three of the mothers, Mrs. H. L. Creed, Mrs. Earl Hardin, and Mrs. Sam Talbert, volunteered to give their time and labor as cooks. And what cooks! I agreed with the small youngster who rubbed his tummy over the fried chicken and whispered ecstatically "Golly." From this school, too, the day before camp opened a group of parents had come down and cleaned the main hall, the cabins, and washed all dishes.

The classes are held in two-hour sessions, with field trips included. Wildlife, birds, insects, water biology, soil conservation, check-dams, forestry, fire-prevention, Nature trails, rocks and minerals are among the subjects integrated. Conservation is the over-all theme. These children are beginning to understand that, in most cases, conservation does not mean *denial of use*, but *wise use*,



Youthful biologists at the school camp investigate the resources of a stream to learn the interrelation of the life that is found in it.



Principal Robinson of Henderson School in Salisbury leads a group of eighth graders on a Nature trail. They are preparing for a camp school.

including scientific management and control.

I spent several days at last October's camp, following several of the classes. In the rocks and minerals class Margaret Wall led her group to an interesting rock outcropping above a stream-bed. There the children were learning "to read the story the rocks have to tell."

"But other things also have stories to tell," said Mrs. Wall. "Indians used to live hereabouts; we have found their arrowheads and bits of pottery. See that ancient tree with its lower limb bent out at an angle? That indicates an ancient Indian trail."

On the rocks the children noted some different kinds and stages of lichens. They observed how the lichens helped disintegrate the rocks, eventually building soil.

They collected specimens of rocks, recognizing granite gneiss, milk and smoky quartz, feldspar and mica. They knew their State led in the production of feldspar, and how important its mica was. At an old rock quarry they learned something of how various rocks are formed; to understand and identify such terms as *dike* and *sill*. Occasionally, on such field trips, a bit of mineral is found, a semi-precious stone, or even a fossil.

In water biology (and how those ten-year olds loved to use that important sounding term) with Bill Hamnett, of the State Wildlife Resources Commission, the children waded about a stream-bed, finding fresh-water clams, crayfish, water boatmen, backswimmers and various other small stream inhabitants. Later, walking along the edge of the dam, the water low because of drought, they saw some former "nests" of blue-gill fishes. Mr. Hamnett explained how these nests were formed, pointed out also several close together—the children counted nine—and that "each fish lays around 5000 eggs." *Fish arithmetic* quickly followed. If all those eggs hatched there would have been 45,000 blue-gills from that one small area alone!

"That's too many," shouted the children, while Bobby, who had run ahead called, "And here's a lot more nests!" So the children realized there would not be room enough, or food enough, if all the eggs laid did hatch; that Nature takes care of such a situation by what is known as "balance of nature," and that most of the eggs had furnished food for other creatures—fishes, turtles, birds, and other forms of life.

Regretting leaving this group, but anticipating looking in on Lunette Barber's wildlife class, I hurried over to it, and listened, enthralled. She held those children's rapt attention, discussing not only wildlife but integrating it with "the four things God gave us that we cannot

live without, that are here for us to use, but to use wisely. What are they?" Those children knew! "Soil, water, forests, wildlife," they shouted.

Soil was subdivided into sections dealing with food, clothing, shelter, and wildlife. The children quickly grasped the fact that, indirectly, all food comes from the soil; how soils, water and forests go together; the part forests, water, and soil play in the well-being of wildlife. All this time the children were busily taking notes. On this particular day the subject was the fishes of the State, and they learned we have 100 different kinds of fresh-water fishes, and through an excellent colored chart they were soon able to identify the ten most important ones. They learned, too, that there are about 400 kinds of birds in the State, and 22 kinds of mammals.

The teacher's talk was interspersed with informal, human interest comments. And when she had finished, and summed up the essential points, those children knew them!

In forestry the children learned how to identify trees; how they grow; their uses; how weed trees can crowd out good trees; how pines are the important timber trees of the South; how to plant them; the importance of trees on watersheds; about thinning for pulpwood; what trees are valuable for food for wildlife. In fire-prevention they had demonstrations of the use of rakes and fire-extinguishers; of how farmers and others can organize to fight forest fires. They were taken to fire-towers and given demonstrations of radio and communication systems used in fire-fighting. All this tied in with their cook-outs, when they carefully raked all leaves and forest litter away before lighting the fires, seeing that no sparks escaped, and having buckets of sand and water available. Leaving, they made sure that all fires were extinguished.

In soil conservation each group was taken to some

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revenue derived from the sale of timber on the re-transferred lands, go to the Olympic National Park to help maintain and increase the recreational facilities in the Park so that your readers may better enjoy their visit to this magnificent National Park.

In our opinion the American people should tell their Congress they want the Program we have outlined, or a similar one, carried out promptly. Should the Congress act, the following results will be attained, results of benefit to all the American people:

First, ten to fifteen thousand jobs will be created directly and indirectly. The jobs of those people now working in the forest products industries of this area will be made more secure.

Second, \$60 to \$80,000,000 of new wealth will be released annually into the economic arteries of this state and nation.

Third, the wonderful recreational opportunities inherent in this magnificent Park will be opened up so that more people—men and women and boys and girls—will be able to enjoy far greater freedom of recreation than in the last 30 years under existing policies. ❀ ❀

neighboring farm where they observed such soil practices as contour ploughing, terracing, ground cover, and wise planting. Thus the days ran the gamut of the courses, including check-dams, insects, birds, and the interrelations of all the various phases of the outdoors.

Nor is it all work and no play for these woodland Jacks and Jills. Recreation has its place. There are physical exercises, games, square dancing, and, when the weather permits, swimming and fishing. At night there are Vespers, planned and conducted by the children.

On Friday afternoon of Camp Week the children organize and put on their own "Show and Tell." The Staff say to the children: "This is your chance to tell us and the other children what you have learned."

All through the week the children had anticipated this and thought about what they would do. Some gave demonstrations of forest-fire fighting; others of building check-dams, explaining how they helped check erosion. One small girl had saved one of the borings the forester had made in a tree and told how a tree's age could be told by its annual rings, and by their variations in size, kinds of weather. Another child spoke of the part lichens play in breaking down rocks and building soil. Birds' nests were shown, and something told about the bird that built it, its food habits, its range, its young. Wasps' nests, tree leaves, a collection of twigs—all were presented and with stories.

I was impressed by the poise of these children, by their self-confidence, their ability to analyze, their lack of self-consciousness in public speaking, their insight into the principles of conservation, and above all, by their interest in the natural world about them. No child who has been through such a course of training would ever be at a loss as to "what to do," never be bored, never lonely. And I doubt there will ever be a juvenile delinquent among them. ❀ ❀ ❀

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tunity under National Forest administration. Excellent as is the U.S. Forest Service recreational program, it is still woefully ill-supported by appropriations. Furthermore, under Mission 66, the National Park Service is at last in a position to provide more adequately for the public use and enjoyment of our national parks. A program of development for Olympic National Park has been matured and is ready for implementation.

As we observed in our editorial last January, Mr. Olzendam's proposal for the juggling of funds, theoretically to be derived from harvesting the virgin forest he wants cut out of the park, are counter to established government policy, and as glib as they are unworkable.

Finally, the American people must rely upon the judgment of Congress, the knowledge of the Secretary of the Interior, and the wisdom of the Director of the National Park Service so far as any national park is concerned. These public servants hold such unsurpassed areas in custody for today, and for many tomorrows. We do not believe that the American people wish to trade them for temporary jobs, or the temporary wealth of harvestable timber. ❀ ❀ ❀



PHOTOGRAPH BY DEVEREUX BUTCHER

View from the Cabot Trail looking south along the west coast of Cape Breton Highlands National Park. The Gulf of St. Lawrence is at the right.

Your heart is in the highlands at

Cape Breton's Park

By DURYEA MORTON

IT WAS a cool August evening when my wife and I arrived on Cape Breton Island after leaving our home in steamy Washington, D.C., less than four days before. We were settled with our hosts on their front porch overlooking the Bras d'Or Lakes, thinking how wonderful it was to be gazing at the wilderness that stretched before us far from the city's summer heat. Our host interrupted these thoughts saying, "Now that you are here you must certainly drive the Trail."

As the conversation unfolded, "The Trail" turned out to be the Cabot Trail, which winds through most of the northern tip of the island, and runs through the Cape Breton Highlands National Park. Our interest was sparked by descriptions of one-way traffic in the old days, steep cliffs, and a country reminiscent of Scotland, with fascinating mammals and birds. We felt we must drive the trail ourselves.

So it was that, not long afterwards, we headed north and west toward the entrance to the Cabot Trail. We found that the route was named for John and Sebastian Cabot, the explorers, because the northern part of Cape Breton is said to have been a stopping place for them in 1497.

Our drive from the Bras d'Or Lakes took us through rolling countryside along roads that led through the Margaree Valley that is so noted for its salmon fishing. Being late in the summer, the hardwoods along the

Margaree River were beginning to turn, and there was a crispness and sparkle that comes with promise of fall. Toward evening we arrived on the west coast of the island and turned north toward the fishing village of Cheticamp and the entrance to Cape Breton Highlands National Park. We registered at the Warden's office and then continued on through the deepening twilight. For six miles we made our way between steep hills. Then, suddenly, the road dipped abruptly to the shore of the Gulf of St. Lawrence, and, at the Corney Brook campsite, we stopped for our first night in the park.

After dinner we sat on the shore and enjoyed the thrilling sunset for which this area is renowned. It was here that we also saw, upon awakening one morning, four adult bald eagles. They were sitting on stubs of weathered driftwood not 200 feet in front of our tent, and so evenly spaced they could have been placed by hand. The glossy sheen of their back feathers reflected the early morning light, and their great yellow talons and beaks looked formidable. We saw many more eagles on our trip, and they always appeared under the most spectacular conditions. They would be soaring below us as the road wound up and around narrow gorges, or be perched on jutting promontories of rock looking regal, defiant and just as we had always pictured them in our minds.

Throughout our stay in the park we were impressed



PHOTOGRAPH BY THE AUTHOR

Entering the park early in the evening was to meet this northern wilderness in one of its many moods.



Looking east toward the outer end of Middle Head in the park. (Below) Mary Ann Brook Falls is one of the many beauty spots in this area.

PHOTOGRAPHS BY DEVEREUX BUTCHER



by the great variety of habitat. There were ocean shoreline, lush hardwood forests in the valleys, rugged and precipitous hills thickly covered with conifers, and, high on the plateaus, typical northwoods bogs. It is these habitats that provide such a variety of wildlife and their accessibility is a delight to the naturalist.

We hoped to see one particular bird and one certain mammal during our trip. In both cases we were successful. The bird we sought is one whose unpredictability challenges the imagination. The arctic three-toed woodpecker is only nine or ten inches long but, because of its definite food preference and therefore changeable range, is a notable addition to any birder's list. This beautiful black-backed woodpecker, the male of which has yellow on its head instead of the red we usually associate with woodpeckers, was right where Peterson's *Field Guide to the Birds* said it should be—in any area that has recently been burned.

Patches of land, three or four miles before the sharp winding descent to the cluster of houses that form the town of Pleasant Bay, were recently gutted by fire. Sufficient time has passed, however, to allow wood-boring beetles to begin their work. Consequently this is the place to watch for the arctic three-toed woodpecker as it rips away great chunks of bark in its search for the beetles.

At first glance this area was bleak and apparently uninhabited. The skeletons of trees were everywhere, but the undergrowth of ferns, flowers, and small shrubs had grown in quickly. Throughout this understory of plants there was the ever-present movement of the white-throated sparrow and Lincoln's sparrow. But the thought in our minds as we searched seemed to be, "Will the three-toed make its appearance?" It did, and we spotted our first bird because of its loud "crick, crick" note. In one instance we did not need binoculars to see the three toes perfectly as the bird clung to a lichen-grown tree trunk.

The moose was the animal we wanted to see, and was not quite as cooperative as the bird. Every morning and evening for more than a week we examined all the likely feeding pools with no success. During the second week of our search, one morning dawned so bright and clear that we decided temporarily to abandon the search and hike the trail from Warren Lake toward the Lake of Islands in the interior of the 390-square miles that form the park.

Mists rose slowly over Warren Lake as we left its shore and invaded the waist-high grasses beyond its western end. Loons calling from the surface of the lake and the occasional note of the brown-capped chickadee were the only sounds heard. During a momentary pause to look back over the lake before entering the hardwood forest, there suddenly was a great splashing and thrashing in

the nearby water. Hurrying to the lake's edge, we saw a cow moose standing knee-deep in the water. Then out of the forest burst a moose calf. With its peculiar foot-flinging gait it plunged into the water and joined its mother, who let the youngster prance and splash for a few minutes, then led it away through the forest. Our glimpse was all too brief, but we had seen our first moose and been witness to an intimate family scene.

Continuing our trip toward the Lake of Islands, we stopped for lunch under a magnificent stand of hemlocks, giants that towered 75 feet or more over the trail. I like everything about the hemlocks—the wonderful feeling of space as I walk beneath them; the sound they make; their smell. Perhaps, most of all, I like the countless needles and cones that form a carpet and muffle outside sounds and make me more aware of the majesty of the trees. Although we did not continue along the trail beyond this point, we felt we had spent a day in one of the few remaining wilderness areas in the East, and it left us with an overwhelming sense of satisfaction.

While there are numerous cabins adjacent to this island park, and listed in a booklet published by the Province of Nova Scotia, we preferred to camp at the three campsites within the park itself. They are well managed and a credit to the Canadian Park Service. We never missed a chance to stop at the roadside stands in the villages to buy the curiously shaped and wonderfully delicious homemade bread, or freshly picked blueberries, and to listen to the soft voice of the owner speaking French, Gaelic, or English with a thick Scotch accent.

Our journey around the Cabot Trail was leisurely, for we stopped as the spirit moved us and explored the areas on either side of the road. For the botanist there are a wide variety of northern plants in bloom throughout the spring, summer and fall. Here is where the black spruce lives, stunted by the wind. Here, too, grow both the purple-fringed and white-fringed orchids, Labrador tea, and pitcher plants, while all around, to test one's knowledge and skill, fly Canada jays, brown-capped chickadees, Cape May and bay-breasted warblers.

The drive down out of the mountains into the Aspy Valley was a memorable experience. Again we met an abrupt contrast in habitats. Stopping at the last turn before entering the valley we saw a long strip of farmland bordered by steep green hills of conifers and hardwoods leading to the town of Cape North. A sliver of light beyond that was the Atlantic Ocean.

At Cape North the Cabot Trail leaves the park for a few miles. From here around to Park Headquarters at Ingonish the landscape takes on an entirely different feeling. *(continued on page 388)*



PHOTOGRAPH BY THE AUTHOR

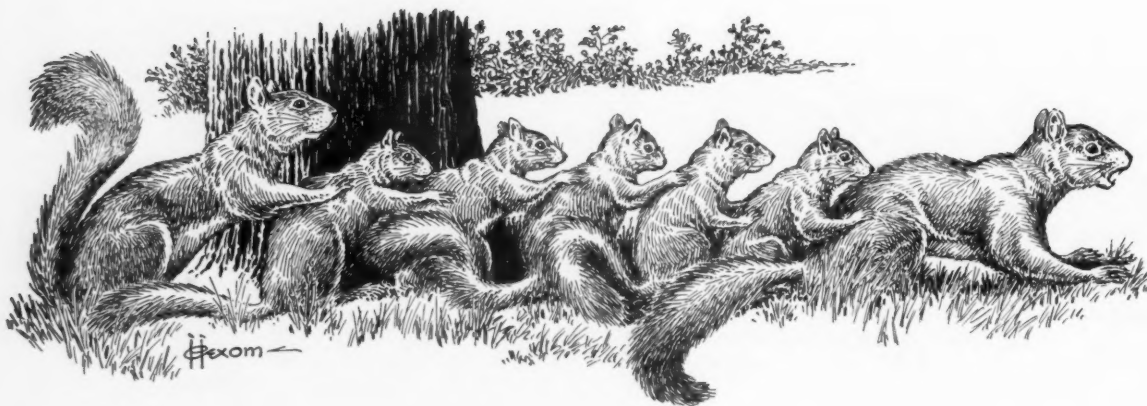
There are many thrilling views of the rugged coastline as the visitor follows the Cabot Trail.



The view looking west from the south side of Middle Head toward the inland highlands. (Below) The highlands near Corney Brook on the west side of the park.

PHOTOGRAPHS BY DEVEREUX BUTCHER





The Long Mount

By CLARISSE DEODATA HEXOM

STRANGE things do happen in the world of Nature. Our yard adjoins that of my husband's parents. There is no fence or special hedge between the two lots, and they appear as one large and beautiful garden.

From late spring until fall, a profusion of colorful blossoming plants, rose-covered arbor, rock gardens, lily pools, and a variety of shrubs are a standing invitation to wild things. To attract them further are a gray birch, apple tree, three high-pointed pyramid arbor vitae, and two transplanted native cedars. To complete the setting are two large American elms, one on each lot, with heavy limbs and branches culminating in a canopy of shade-spreading foliage. Birds of various kinds flit from one to the other. They love it, as do the gray squirrels, who commute back and forth from one nest to the other.

It is a peaceful community of wildlife, disrupted only on occasion by a family of domestic cats, "Snoopy" the mother—a tawny colored, silky furred Persian—and her four kittens. Snoopy and her kittens, household pets of the parental home, were usually well behaved, as they were always reprimanded when caught in the act of disturbing the peace of our furred and feathered friends. Nevertheless there were moments when Snoopy would revert to the wild feline type. Naturally the kittens would try to emulate the mother. And this leads us to a strange incident.

It happened on a sunny Sunday afternoon in summer. My husband was sitting in the back yard reading and planning some art work. A chattering family of gray squirrels in our big elm tree drew his attention. Not all of them could be seen, but they could be heard. Apparently they were carrying on a consultation. Their chattering lacked the scolding bark so often heard.

Listening, Phil did not make a move from where he sat.

Down from the elm tree came a mother squirrel. Following her, one at a time, came five young squirrels, and then the father squirrel, who acted as rearguard. They lined up on the ground in the "long mount," each squirrel putting his forefeet on the back of the one in front. Many a time we have seen elephants do the "long mount" at a circus, but never before, or since, had we seen any of Nature's wild creatures go through antics of this kind. Although squirrels are quite acrobatic in their play, this was not play. Was it instinct on the part of this family of gray squirrels? Or was it some form of family training for defense?

Without breaking formation, they thus marched rapidly across the intervening lawns and, by-passing the cats, arrived safely at the foot of the other elm tree. There they broke formation and hurriedly scampered up the trunk to their other nest.

The cat and her kittens, like spectators at a circus, merely looked on at this strange procedure. They seemed so amazed that any thought of chasing or attacking the squirrels was forgotten.

The squirrels, ganging up in this manner, must have had the idea that united we stand, divided we fall. At any rate, it was something out of the ordinary in animal behavior and fascinating to see.

This incident took place several years ago. Now the elm trees, having grown to such proportions that they were unsafe to property, are no more. The rose arbor and lily pools also had to be removed. And the cats have all gone. But the other trees still remain, the rock gardens, numerous shrubs and perennials, all of which continues to be a haven for birds and squirrels throughout the seasons.



Written in Stone and Apple Trees

By HOPE SATTERTHWAITE JEX

"...he left evidence of his
presence spelled in stone."

"And he left his apple trees."



LONG years ago a hopeful heart sought to claim this bit of land for human uses. He felled the virgin timber. He painfully heaved stones from what must have seemed a singularly unyielding earth, and with them laid out a boundary wall and a foundation for his hearth and home. He planted apple trees.

But his acumen, as it turned out, was not the equal of his courage. His choice of homesite could hardly have been less propitious. Beyond the brief stretch of level ground bordering the river the land pitched steeply. Upon this slope, close to an upland spring and near the old road that curved over the shoulder of the hill, he built his house. From its windows he could look across the valley to distant hills, or he could drop his gaze to his own patch of stony earth, which must have been a grief to spade and plowshare. For the stones he had moved with backbreaking fortitude proved to be but a token outcropping of the New England rock that lay beneath the shallow soil. There is no written record of his toil, his laughter, his disappointments or his dreams. It would be a task, in all likelihood an impossible one,



to find even a record of his name. Like the New England Indian, he vanished. But he left evidence of his presence, spelled in stone. And he left his apple trees.

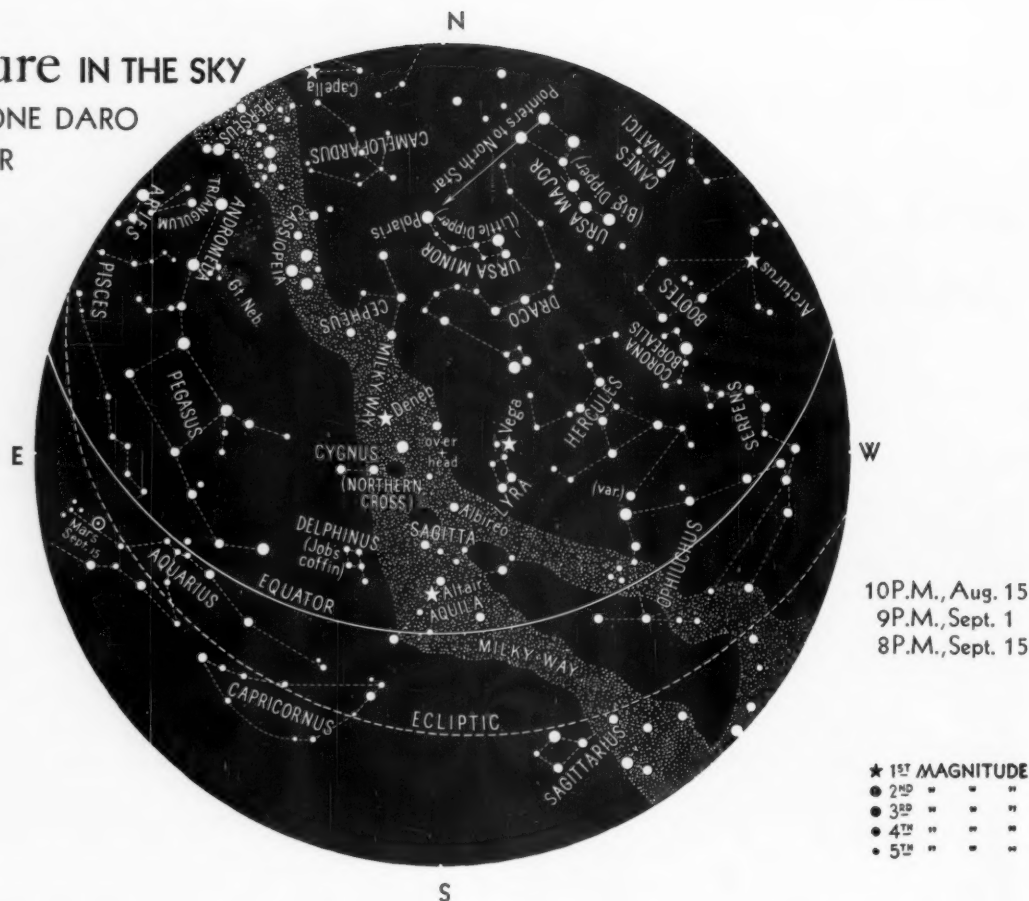
Time passed. Perhaps his house mouldered; perhaps it burned; perhaps it was torn down. Certainly, succeeding landowners saw the soil as fit only for pasture. Year after succeeding year, cows found shelter from the summer's heat beneath the untended apple trees, and munched their cuds amidst the gold and purple of invading goldenrod and joepyeweed. Year after succeeding year, the weather and earth's urge towards growth combined to veil beneath sod and greenery the forgotten labor of a long dead human hand. Only the remnants of the stone wall persisted, and the stubborn outthrust of a chimney base, and the apple trees.

Within recent years even the cows have been excluded from this bit of land. Overgrazing and broken fences—barbed wire instead of stone—probably contributed to their exclusion. Why mend fences where rank weeds are rapidly replacing grass? With the departure of the cattle the woodland to the south at last has had its chance. Hemlock, birch and beech, maple, oak and elm are thrusting forward. The pines that crown the hilltop have sent a vanguard of cadets down towards the river. An alder thicket, red osier dogwood and a raspberry tangle hide the upland spring. And a few lusty patriarchs that somehow escaped the dreamer's axe point up the picture. Today the stone wall has changed from barrier to memorial, and it takes a search to find the chimney base. But, although their vigor is diminished through neglect, the apple trees have not succumbed.


The dream is dead. Even the toe-hold of pasturage has been relinquished. The land and the wild things of the land have taken over. Cottontails find winter haven in the alder thicket. The skunk has a wide choice of abandoned woodchuck holes in which to drowse away the snowy weeks. No human meddling disturbs the raccoon's snug retreat in the ancient sugar maple. Crows and marsh hawks need fear no (continued on page 388)

Nature IN THE SKY

By SIMONE DARO
GOSSNER



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the

map, which is the point overhead, will be seen the constellations visible in that part of the heavens. Times given are for Local Standard Time. 

Is There Plant Life on Mars?

ON SEPTEMBER 7 of this year, Mars will come closer to the Earth than at any other time since 1924. Its distance will be 35.2 million miles, its brightness -2.6, its apparent diameter 24.8 seconds of arc. By way of comparison, we may note that it will be exceeded in brightness only by Venus and the Moon, and that its apparent diameter will be more than three times as big as it was last April.

Once every two years and fifty days, approximately, Mars is in opposition with the sun; that is, Earth comes between the Sun and Mars, and we get a closer view of the planet. But, even at that time, its distance from Earth may vary anywhere between 34.6 and 62.9 million miles. Every fifteen or seventeen years a really close approach takes place. In this century they have occurred, so far, in 1909, 1924, and 1939. The remaining ones will be in 1956, 1971, 1973, 1986 and 1988. Signifi-

cantly, the most important discoveries concerning the planet were made during these close approaches. It was during the approach of 1877 that Asaph Hall, at the U.S. Naval Observatory, discovered the two Martian satellites. During that same period, G. V. Schiaparelli at Milan, Italy, began his observations of the "canals" and so touched off one of the liveliest controversies of the century.

It all started innocently. During exceptional observing conditions, Schiaparelli noticed on the surface of Mars a number of markings that looked to him like a network of fine lines. For want of a technical term he designated them by the Italian word *canali*, meaning "channels." The word is also used in Italian in the sense of canals, or man-made waterways. Schiaparelli, however, never intended to imply the existence of intelligent beings on the planet and never participated in the

controversy that followed.

Some of his foreign colleagues showed much less restraint. They promptly hailed his discovery as positive proof that there is civilization on Mars. Many others, however, adopted a more sober approach. It was pointed out that the appearance of the canals might be nothing more than an optical illusion. It has not yet been possible to photograph them convincingly, because the atmosphere around the telescope is not steady enough during the length of the time-exposure required. Therefore, we have only the record of visual observations; yet, many skillful observers have never been able to see the canals. It is also a well-known psychological fact that the human eye tends to integrate what it sees and to imagine shapes among formless objects (cf. for example the ink-blot test). In classroom experiments, students have been asked to draw what they saw from a distance of a group of dark dots suitably arranged on a light background. Many have drawn connecting lines where there were none to see. Even though they had no knowledge of the purpose of the experiment, some have turned out drawings that closely resembled the network of canals described by observers of Mars.

So much for the optical illusion. Using a different approach, do we know anything about conditions on Mars that would shed some light on the possibility that life (not necessarily human) exists there?

It is an understatement to say that the Martian climate is extreme by our own standards. The seasonal temperatures range from 70°F in summer at the tropics to -150°F during the long polar night. For comparison, the lowest temperature ever recorded on Earth was -90°F at Verkhoyansk, Siberia, in 1892. The atmosphere is very thin, the atmospheric pressure being only one-fifth of the pressure at the top of Mount Everest. It contains a very small amount of water vapor and only traces of oxygen. There is no ozone layer to protect the surface from deadly ultra-violet rays. Quite evidently we could not live there without special equipment. This is true, also, of all terrestrial animals and plants as we know them.

Yet, the markings on the planet exhibit color changes throughout the Martian year. These color variations appear closely associated with the seasonal melting of the ice on the Martian polar caps. Could it be that there is vegetation on Mars? Surely our Earth, viewed from a distance, must show green patches in summer and brown ones in winter. What could be more logical than to assume that the color changes of the markings on Mars are due to similar causes? But nothing is that simple in astronomy. It has been pointed out that, contrary to terrestrial vegetation, the "plants" on Mars do not disperse infrared rays; that there is no indication of chlorophyll absorption; that the markings are not even

green, but, rather, dark blue, and even violet. Adding to this the absence of protective ozone, the paucity of water and the rigors of the climate, one begins to wonder whether the hypothesis of plant life on Mars is at all acceptable.

Some unusual experiments, conducted in Russia in the past few decades, indicate that, on the contrary, this hypothesis is not as far-fetched as it seems. The purpose of the research was to find out how terrestrial plants adapt themselves to extreme conditions. The Russian scientists are well equipped for this work because their

vast country presents them with a natural laboratory where almost all extremes of climate are represented. By studying the behavior of plants and trees at sub-arctic temperatures and on high plateaus, they found, for example, in spectroscopic observations of the Tien-Shen fir, that the chlorophyll absorption band, present when the temperature is above freezing, dis-

appears completely under 32°F. They observed, also, that the Tien-Shen fir disperses progressively less infrared radiation as the altitude increases (or, in other words, as the temperature decreases). Extrapolating this notion, they have suggested that plants subjected to the much colder Martian climate may absorb not only the infrared, but the red, yellow, and green as well, in an effort to retain heat, and disperse only the blue and violet. In support of this, they point out that blue and violet tints are prevalent among the vegetation found above 13,000 feet in the Pamirs.

In contrast to the "vegetation" theory, D. B. McLaughlin, at the Observatory of the University of Michigan, has recently proposed an ingenious explanation that seeks to account for the appearance of permanent surface markings on Mars without evoking the presence of plants. Considering the shape and distribution of the markings, McLaughlin draws attention to their great similarity with a simplified diagram of terrestrial wind patterns, and suggests that they are drifts of sand, dust, and volcanic ash, deposited by Martian trade winds. One must remember that Mars has no high mountains and no oceans, and that it must have a much simpler and much more regular pattern of winds. This would account for the permanent shape of the markings as well as their orientation. On the other hand, the material that deposits to form these markings must be constantly regenerated. McLaughlin attributes this function to active volcanoes. Besides furnishing the dust, these volcanoes would throw into the atmosphere enough moisture to cause chemical reactions and subsequent color changes in the markings.

It has been pointed out that the two hypotheses concerning the origin of the markings are not mutually exclusive. The wind patterns and the moisture-giving volcanoes might very well shape and "water" the areas on which vegetation grows. (continued on page 388)

STARS ON A FIELD

*What galaxies, what Milky Ways and suns
Are on this field of stitchwort, columbine,
And mint! On interplanetary runs
The bees maneuver on the spatial line.*

Daniel Smythe

Nature IN THE SCHOOL

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University,
and Director of Nature Education, The American Nature Association

Goldenrods and Asters

SOME HAVE PROPOSED that the goldenrod be our national wild-flower, pointing out that it is found, in one form or another, from coast to coast and from border to border. Legislation was once introduced in Congress so to recognize this widespread plant, but lapsed because it was claimed that goldenrod was a major cause of hay fever. Although this is not true, the impression still prevails and the goldenrod is not likely ever to attain such recognition.

Our special insert this month suggests the general geographic distribution of some common goldenrods and asters. It will be noted that most of these are essentially eastern, and there are more eastern species. When it comes to sunflowers, about which we hope to have another insert, the emphasis will have to be given to western species. Teachers may wish to have their pupils map the range of the species they find represented locally, and to point out, also, where the different species may be found locally. Some obviously thrive best in shady woodlands, while others do better when exposed to the sunlight.

Our insert, with its emphasis on the relation of these plants to esthetics, economy, health and industry, may aid the general science teacher who seeks to emphasize similar categories. Probably the most dynamic of these will center around the health interest, and the schoolroom may provide a convenient laboratory in which children may learn through cautious and controlled experience something about their susceptibility to the pollen of some of the local species. Variation, of course, will be found in the different species of plants, and in the different stages of their development. Similar variations may be found in different children, and eventually they may learn that susceptibility may also vary with their age. A few cautious sniffs

may or may not bring significant reaction in the form of sneezes, runny eyes or runny noses, which may be useful knowledge to a child who plays much of the time outdoors where the plants may be growing in abundance.

Goldenrod in school

There are probably relatively few schoolrooms in which the teacher or the pupils may not display a bouquet of goldenrods or asters for ornamental purposes. Even in the cities, far from open country and woodlands, the plants may find a place through the medium of the flower shops. Those who live near large cities where many persons spend short holidays in the country will notice how frequently the returning city dweller brings along a bundle of these flowers.

There are some problems that are too complicated for solution at the pre-college level, but these may be recognized as problems at that age level. Why, for example, do we find New England asters that vary in color from a deep purple through pale blue to violet, red and even white? They all belong to the same species. Then why the color difference? Is it related to soil differences, or what? What happens if plants bearing blue flowers are transplanted to soil that yields red flowers? Is the cause an ecological one, or is it genetic, in which case, of course, the transfer would make no difference whatever?

Children can easily check the length of season in which bees may be observed feeding on nectar and pollen from the different goldenrods and asters available for observation. Which of the local species provide the longer season of "pasturage" for these useful insects? When a favored species is used for a while is it abandoned for some other species of plant that may enter into competition? How early and how late in the day are goldenrods and asters used by bees, and how early and late in the

season can this be observed? Do other insects than the honey bees seem to share their interest in our plants when seeking a meal?

Useful to hold soil

Children should dig up a few goldenrods and asters, if for no other reason than that they may observe the spreading underground parts that may serve as a soil anchor in the prevention of undesirable erosion. They should also observe what wild birds and mammals use these plants as a protective cover. Do rabbits, under the stress of pursuit, seek the shelter of these plants or of shorter plants? Do deer ever seem to use the plants for a protective cover?

If goldenrods and asters are used for schoolroom decoration it will be noted that the different species vary in their durability as ornaments. Some of the asters may begin to wither almost as soon as they are collected. Others may continue to be attractive for an almost indefinite period of time. The insert points out that, unfortunately, one of the most attractive of the goldenrods, so far as beauty and fragrance are concerned, is also one of the worst so far as hay fever is concerned. If one wished to do so he might imply that the plant developed its attractions so that it could effect its nefarious purposes. Of course, there is nothing in such an assumption, but neither is there anything in many of the other prejudices we may have about these and other forms of life to be found locally. A proper adjustment of ourselves to goldenrods and asters may help us make similarly reasonable adjustments to other organisms.

To start fires

Scouts may be interested in the use of the dead tops of these plants when it is desirable to start a fire quickly. Should such a fire get out of control it may kill many plants and animals, but the chances are good that it will do little to injure the goldenrod and aster crop for next year. The reason for this, of course, is the presence of the underground parts, in which food is stored, and in which buds for the new year may be formed safely underground long before they need to begin to develop. This same character makes it possible to harvest the tops of these plants with little fear that the plants will be harmed by the practice. On the other hand, the plants may be readily kept under control by shallow plow-

ing, which exposes these survival devices, and by the use of cultivated crops next year to prevent the development of new plants from fragments left in the soil.

Science teachers, interested in developing in their pupils some reservations regarding the value of hearsay and tradition, may find our goldenrods and asters fruitful sources of study. Even the etymology of the scientific name *Solidago* for our goldenrods has lost its significance with the increased understanding the science of medicine has given us. This is explained in the text of our insert. The name *Aster*, of course, refers to the sunlike resemblance of a head of these flowers. There is no great danger that the appropriateness of this resemblance will be questioned. However, some of the asters are far less radiant than are some of their relatives, and some of the more radiant are, strangely enough, less attractive to the bees. The reason may, of course, be that some of the asters use fragrance as an advertising medium, and man is notably inefficient in detecting scent in many forms that are highly significant to other animals.

Children may be interested in noting the percentage of magazines that appear during the goldenrod-aster season that feature pictures of these flowers, either on the cover or in featured sections inside. Such a study may call to attention the fact that these plants are an important factor in completing the picture most of us have for late summer and autumn outdoors.

Banding Records

Recent announcement of the recovery in Australia of a band placed on a tern in Scandinavia is believed to establish a new record for long-distance bird flight. This highlights the importance of the bird banding program in yielding the secrets of bird migration and distribution. At the banding office of the U.S. Fish and Wildlife Service at Laurel, Maryland, there are 7,000,000 records of birds banded since the program started early in the century. More than 600,000 of the banded birds have been recovered, in one way or another. There are some remarkable distance records, and interesting longevity data, as well. Leaflet 373 of the Fish and Wildlife Service tells the interesting story of bird banding and its meaning.

Bulletins

"Pet Myna" by Anne Keith is a 40-page, illustrated booklet on the care, raising and instruction of these talking birds. It is published by All-Pets Books, Inc., P.O. Box 151, Fond du Lac, Wisconsin, at fifty cents.

"Unitron" is a booklet listing astronomical telescopes, giving advice on the selection of a telescope and including a new observers' guide. Available from Unitron Instrument Division, United Scientific Co., Dept. NM, 204-6 Milk Street, Boston 9, Massachusetts.

"Health in Wilderness" by Olaus J. Murie is a reprint of a fine article that appeared in *Health Magazine*, and has been reprinted by The President's Quetico-Superior Committee, 919 North Michigan Avenue, Chicago 11, Illinois.

"Alfalfa" by J. C. Hackleman is a 19-page pamphlet published as Circular 756 by the University of Illinois College of Agriculture, Urbana, Illinois.

"Modern Man" by Ashley Montagu is a discussion of man, with the story of his past development and future possibilities. It is published by Science Research Associates, 57 West Grand Avenue, Chicago 10, Illinois, for sixty cents.

"An Approach to Conservation" is a presentation of the basic philosophy, objectives and procedures of the Foundation for American Resource Management, 582 Monadnock Building, San Francisco 5, California.

A number of bulletins and reprints are available from the Quetico-Superior Committee, 919 North Michigan Avenue, Chicago 11, Illinois, to those interested in the wilderness and its preservation.

"Concepts of Conservation" is a 48-page booklet published by the Conservation Foundation, 30 East 40th St., New York City. It is a Guide to Discussion, seeking to help those "who sense that the natural resources of America are their concern, and who seek—through discussion and reading—a better understanding of the problems involved in intelligent resource use." Excellent basic information is supplemented by a carefully selected bibliography.

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THE Nature CAMERA

By EDNA HOFFMAN EVANS

Search for Shangri-La

DOWN THROUGH THE CENTURIES mankind has been searching for an ideal spot on this earth—a place so beautiful, so peaceful, so utterly charming that one must, perforce, forget all his woes and worries when the ideal spot is found. The place has been called by many names, but Utopia and Shangri-La are the best known. Yet, so far as I know, neither Utopia nor Shangri-La exist anywhere except in books and in the minds of the seekers.

Of course, everyone has his own ideas about what that ideal spot on earth should contain. Sir Thomas

thusiasts would want quantities of birds; herpetologists, on the other hand, would want the place to be crawling with reptiles—a quality that might seem far from "ideal" to those who do not fancy the cold-blooded species. So there are many ideas of what that ideal spot on earth should contain.

The author's Shangri-La

One so-called Shangri-La is located not so very many miles from where I live. It is somewhat isolated, as all Shangri-Las should be, so I never had the opportunity of visiting it until recently. My own reactions to it puzzle me, and I wonder wheth-

one leaves his car and either climbs aboard a horse for a three-hour ride, or hikes in—a matter of about eight miles of steady (and frequently steep) climbing—down, if one is going in, or up if one is coming out. Food, bedding, and whatever supplies one wishes to take must be carried on pack horses, or on the back of whoever is going to use them.

Havasu Canyon has been inhabited, since before the coming of the white man, by a small tribe of Indians, the Havasupai, who today number a few more than 200, with about 150 of them living within the confines of the valley. There are about 500 acres in the valley floor, strung out in a narrow ribbon of several miles length on either side of the Havasu River.

It sounds ideal, does it not? Beautiful canyon, beautiful river, beautiful scenery—and Indians! And far enough away so that a venturesome visitor should have it all to himself.

Trip to Shangri-La

And so one afternoon three of us started out. Arrangements had been made, food and photography supplies purchased. We spent our last night in a "civilized" motor court and early next morning turned off the highway on the dirt road. Like most unpaved Arizona roads in dry weather, it was dusty, rocky enough to be hard on tires if one drove too fast, but otherwise quite all right. The scenery was vast and empty and everything went well until we reached Hualapai Hilltop. This we found to be completely covered with parked cars, most of them from California. That was something of a shock and a disappointment, for a Shangri-La is supposed to be a rather private and secluded place.

There were lots of cars, but no horses. Soon, however, we could pick out our own little pack train coming. We could see it far, far down on the canyon trail, the horses appearing little bigger than ants, even through the field glasses.

Hualapai Hilltop is actually a "jumping-off place." The floor of the canyon is hundreds of feet below, almost straight down. Our horses carried us down a rocky trail that wound back and forth across the cliff face; sometimes they almost seemed to be walking down white rock steps.

Below, the canyon was wide at first; but as we progressed it became



This is a print made from a color transparency. Black-and-white pictures do not do justice to Havasu scenery. The rock wall is a warm red, the leaves a green-gold. The two weathered monoliths are called by the Indians the Prince and the Princess.

More, being interested in people, and ideas, and government, made Utopia a political and social ideal; James Hilton put his Valley of the Blue Moon at the base of a lamasery in the remote fastness of the Tibetan Himalayas.

There are other ideas of ideal-ness, too. The photographers would seek ideal picture conditions and scenery; the gardening enthusiasts would want ideal growing conditions for all sorts of plants; ornithology en-

er others may have had similar experiences during the present or some other vacation period in trips to Shangri-Las.

The Shangri-La I am going to describe herein is (naturally) supposed to be a photographer's paradise. It is known as Havasu Canyon, a small side branch of the Grand Canyon in Arizona. To reach it, one must turn off Highway 66 just east of Peach Springs and drive 65 miles on a dirt road to Hualapai Hilltop. There



Havasu Falls thunders down into a blue pool nearly one hundred feet below. On the opposite ledge these opuntia-type cactus plants give an interesting water-and-desert combination. Notice the travertine formations on either side of the falls.

narrower and narrower. White rocks gave way to red ones as we descended several million years according to Grand Canyon geology. Ultimately we were riding between towering red walls with only a narrow ribbon of blue sky high above. It was magnificently scenic, but not especially photographic.

Blue green water

Supai Valley, proper, begins when one crosses the Havasu River. This is an ever-flowing stream that comes into being a few hundred feet from the trail. First it is a wet spot, then a puddle, and before long seepage from above has joined together to make a comfortable little stream. Near its origin the water is crystal clear. Further along, because of the deposits through which it flows, the water takes on the characteristic blue color that gives it its name. *Havasu* really means "blue green water" and *Havasupai* means "people of the blue green water." It is said, and I think truly, that this was the stream that inspired composer Charles Wakefield Cadman to write his "Land of the Sky Blue Water."

Photographically, the scenery is beautiful. At the mouth of the valley, jutting skyward from the crest of a massive red cliff, are two weathered monoliths. The Supais call these formations the Prince and the Princess. Legend has it that the tribe will be safe and secure within its valley as long as those two guardians stand.

The valley floor widens out in

places, and in it grow many gnarled old cottonwood trees, whose green-gold leaves catch the sunlight and provide a colorful contrast to the red walls of the canyon, giving picture possibilities dear to the heart of a color photographer.

Besides the cottonwoods, there are cultivated trees—peach, apple, fig, apricot, and the like. Down through this green valley flows the crystal-clear water of the Havasu, its low banks shaded by alders and willows, and lined, at the time I was there, by countless tree frogs intent on their spring courtship.

The Havasu is not always a mild and gentle creek. Occasionally its waters are swelled by muddy torrents from the canyon country around and then it becomes a raging monster. On its most recent rampage it tore out several apple orchards, washed itself a deeper bed in some places, and changed completely the aspect of the first of the three waterfalls in its course.

A changed waterfall

Yes, there are three waterfalls. Navajo Falls is the uppermost, and the one that has been changed. Formerly the water fell in a fairly concentrated area to form a "bridal veil," but now the stream divides and the water comes down in two places, neither one especially choice from a photographic standpoint.

There are interesting travertine deposits in the old bed of the river. Travertine, a lime formation, is to be found hanging like brownish

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icicles from the edges of the waterfalls. In places where the water has flowed over trees and roots, the resulting travertine incrustation reminds one of coral formations in tropical seas.

Havasu Falls is the middle and largest falls, with water roaring down into a beautiful blue pool at its base. Directly across from the falls, on the opposite ledge, is a thick bed of opuntia-type cactus plants. Here the photographer can get an interesting combination of water and desert scenery.

At the last falls—Mooney Falls—the water drops in a long slender column for 900 feet into a pool below. To get from the crest to the base of the falls, one must scramble part way down a steep trail and then go underground through a steep-descending tunnel to the canyon floor. From Mooney Falls on, the river occupies most of the narrow canyon floor. If one wishes to, he can go on for some miles to the place where the Havasu joins the Colorado in the Grand Canyon proper, but it is a rough trip with not much to offer to the photographer.

An odd disappointment

Back in Supai Village, the people are friendly; the Indian Agent and his wife are most hospitable. There are (for the remoteness of the place) good indoor accommodations or, if one prefers, plenty of camping facilities. Through it all I was comfortable and well fed, but for some reason that I still do not understand, I was not satisfied. Somehow, this Arizona Shangri-La was a disappointment, and every so often I thought of the lines from that old missionary hymn about the place where "every prospect pleases and only man is vile."

The Indians are housed in government-built frame houses, merely pointed-roofed boxes as unimaginative architecturally as is humanly possible. There is junk and clutter around them, first because in that remote place where everything must be brought in by pack horse, every article of possible future use is worth saving. Second, because in that remote place there is no junk collection or garbage disposal, the discarded and the useless accumulates along with the possibly useful.

The people are caught between two cultures—their own primitive one, and the white man's. As yet,

they are not adjusted to either. Their homes are too "modern" to be picturesque and too "primitive" to be at all attractive.

At the time I was at Havasu there must have been several hundred white people in the valley—more, probably, than the total Indian population. We did not exactly get in one another's way, and there were actually times when one could be alone with the wonderful scenery. None-the-less, the trails were dusty and well-trodden, and there were candy bar wrappers and other "civilized" debris to be seen with distressing frequency. For example, before I could take a "shot" with my camera of a rustic log that joined two ends of a path across the river, I had to remove a coffee can and a catsup bottle from the stream bank.

It was another chapter, of course, in the struggle between the Nature enthusiast and the litter-bug. Often, I suspect, the two are to be found in one and the same person. It is a struggle that the National Park Service has waged long and hard, usually with moderate success. However, for those who call our National Parks litter-filled slums, let me say here that Shangri-La can become equally littered, if not more so.

There really is no moral to this story. I have some nice color slides from my trip to Havasu Canyon. Black-and-white pictures do not do justice to the scenic beauties there. I have some pleasant memories, and I wish I could have spent more time there than I did. Given an opportunity, I would go back.

But somehow, I know that I have not found my Shangri-La, photographically or otherwise. It is still over the next hill or maybe around the next turn of the road. My camera is ready, and so am I. Together we are still seeking. Perhaps it is better so. As Browning made his Renaissance artist say—

"Ah, but a man's reach should
exceed his grasp
Or what's a Heaven for?"

Nature Study

"How to Conduct a Nature Study Group" is a recent mimeographed, 22-page manual of methods for developing a Nature study group and is available from the Newark Museum, 43-49 Washington St., Newark 1, New Jersey. It covers a wide variety of practical suggestions for

such work. Copies are available at thirty-five cents each.

Rose Film

"Roses for America" is the title of a new 16mm. sound and color motion picture prepared by All-America Rose Selections. The film runs for 15 minutes and tells the story of the development of the modern rose, taking the viewer across the nation and into America's most beautiful rose gardens. The film is distributed through Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York City, without charge.

Nematologica

During the past two or three decades the non-spectacular but important activities of nematodes, in fresh and salt water, in soil, and as ecto- and endoparasites of plants, insects, animals and man have come to be recognized. In 1955 the Third International Nematology Symposium was held in Wageningen, Holland. It was then voted to found *Nematologica*, an international journal of nematological research. Thus findings of researchers in this field can be more quickly made known. Subscription is \$7.50 annually and should be sent to Messrs. E. J. Brill, Oude Rijn 33a-35, Leiden, Netherlands.

Tissue for Bugs

In order to give the product the strongest test, Whitmire Research Laboratories of St. Louis took their new Repellen-Tissue to the Florida Everglades. This is a tissue impregnated with a special formula, which does not contain messy grease or oil, to repel mosquitoes, gnats, flies, chiggers and others of the biting and bothersome insects. Rubbing the skin with this tissue does the trick simply and is proving a great boon to outdoor people.

Osprey Flight

During the past two years Dr. D. E. Davis of the Johns Hopkins University has banded 123 nestling ospreys, reports *Maryland Tidewater News*. Within three months after they were banded three of the birds were found, either shot or dead from other reasons. One of these was found in the Mato Grosso in the interior of Brazil, about four thousand miles from the point of banding. The other two were found in Cuba, a flight of 1200 miles.

Dangerous Hooks

The burdock is well armed and dangerous to a large number of small animals. The hooks on these burs are designed to "catch" and "hold," and they are efficient. If they attach to a larger animal or to clothing they ride along and distribute their seeds wherever they are shaken out. Judging from the distribution of the weed this is a highly successful method. If they catch an animal too small to carry away the bur the animal is held fast and in struggling to free itself frequently becomes more completely entangled. Securely hooked, it is held until its death, its capture by some predator, or its release by some kind-hearted passerby.

Reports from readers of *Nature Magazine* tell of several rescues as follows: Mrs. Kenneth Chapen of Greenville, Michigan, released a ruby-throated hummingbird; G. A. L. Gibson of Toronto, Ontario, released a golden-crowned kinglet; Frederick Helleiner of Swastika, Ontario, released a wood pewee; R. B. Langley of Cromley, Ontario, released a white-eyed vireo; and R. W. Dowling of Careyville, New York, released baby bantam chickens from the hooks of this weed several times during one summer.

A summary of the reports show other animals caught by burdock as follows: little brown bat (several reports); red bat (two reports); English sparrow; northern yellowthroat; Maryland yellowthroat; black-throated blue warbler; ruby-crowned kinglet; golden-crowned kinglet; phoebe; black-capped chickadee; moths of several kinds; butterflies of several kinds.

Many such incidents happen without anyone seeing them, and many more are seen and not reported. Therefore with this many reported, as a result of a note in *Nature Magazine* in April, 1953, it is evident that burdock is quite an important small animal trap. Thanks to those of you who sent reports.

LEROY C. STEGEMAN

Rhinoceros Beetle in Ohio

The rhinoceros beetle, *Dynastes tityus*, is ordinarily found in tropical America. It also occurs in the southern United States and penetrates farther north on rare occasions. Two living specimens have been collected in recent years in the city of Chillicothe, Ohio. The first one was found in the summer of 1950, when

one of these giant insects flew into the cab window of a truck while passing through Chillicothe. In the summer of 1953, another one struck the car of John Cutright, who is a resident of that city. Both of these specimens were brought to the senior writer while he was teaching biology at the Huntington Rural School, and both were kept alive in captivity for about one week. One beetle was a male which measured 2.25 inches long, 1.13 inches wide, and 0.69 inches high. Only the males have the characteristic rhinoceros-like horns. This beetle is greenish-gray in color with large, scattered black spots on the wing covers. It is one of the largest insects known from North America.

LOWELL P. ORR
AND RALPH W. DEXTER

Conservation Workshop

The Conservation Education Association will hold its third annual four-day Workshop Conference, August 25-29, 1956, at Clemson College, Clemson, South Carolina. The major objective of CEA is to stimulate and improve conservation education in American schools. It is a national organization.

The 1956 Workshop Conference will be devoted to study and analysis of some selected school systems geographically distributed in the States. The theme of the conference is *What are the Characteristics of a Good Conservation Education Program in a Local School System?*

Organizations and agencies and individuals interested in conservation education are cordially invited to attend this conference and participate in its work groups, or send representatives.

Exhibits, displays of literature, and selected audio-visual aids, as well as a banquet program will be included at the conference.

There will be an organized field trip to the U. S. Forest Service Coweeta Hydrologic Station near Franklin, North Carolina. Post-Conference trips to the South Carolina coast and a visit to the Bears Bluff (Marine Resources) Laboratories near historic Charleston will be arranged if there is a demand. To receive full information on the 1956 CEA Workshop Conference, please send your name, position, mailing address, and organization you represent to the conference chairman, Douglas E. Wade, 3403 Duncan St., Columbia, S. C.

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Cape Breton

(Continued from page 377)

It is coastal; low, rugged and rocky. For this reason, many years ago, the Portuguese government set up a training center here for her sailors. At one time Ingonish had an estimated population of 8000.

It was in this vicinity that we encountered our first barrachois, a sort of barrier beach. It is formed by spring flood waters rushing into the ocean with such force that they push sand or gravel under water until it forms a visible barrier. Eventually, if the barrier does not break, the water trapped inside will become completely fresh, fed as it is by the streams from the surrounding country.

Near the end of our trip, as we were examining the outcroppings of gypsum, feldspar, mica and quartz along the water's edge, we decided to head to one of the few sandy spots for a quick swim in the ocean. The day was perfect and a good surf was running. Surprisingly enough the water was not as cold as the ocean in Maine. Perhaps we were being tossed around by the surf so much we did not notice.

One cannot travel long on the Cabot Trail without realizing the tremendous impact the weather has on the landscape. Ocean water beats and grinds the coasts, swirling mists enrich the land for specialized plants, wind rushes in and around valleys and across tablelands, and sun gives energy to living things. All these give Cape Breton Highlands National Park a character of its own, worthy of knowing in all its moods.

If you like the outdoors Cape Breton is beyond compare. It is thrilling and satisfying, stimulating and intriguing. Certainly others who visit Cape Breton Highland National Park come away feeling as we did, that you have left your heart in the Highlands. ♪ ♪ ♪

Written in Stone

(Continued from page 379)

guns. At least one threat, that of biting plow and harrow, has been removed from the meadow vole's life of precarious fecundity. The dreamer, however, has left an unwitting bequest to those that follow him. His crumbling stone wall offers shelter to weasel and black snake. And the wizened fruit of his apple trees remains a table delicacy that not even the whitetail scorns.

And, as if to emphasize her prin-

ciple that nothing shall be lost, Nature appears to be striving to perpetuate the heritage. Safe from the danger of trampling hooves and cud-chewing mouths, a scattering of apple tree descendants have found their chance for life. ♪ ♪ ♪

Nevada

(Continued from page 354)

feature is man-made Lake Mead, the hundred-mile-long reservoir behind Hoover Dam, fifty miles southeast. However, sometimes man's activities must seem sinister and frightening from this aloof point in the sky. For, on occasion, a blinding flash, a deafening roar, and a mushrooming yellow cloud signal that another atomic bomb has been exploded at Frenchman Flat, forty miles to the northwest.

The rising icy wind, scudding black clouds, and a few flying snowflakes finally drove me off the summit and I slipped, slithered and slid down the mountain. After a descent taking four and one-half hours, I stumbled into camp by flashlight at 8:00 P.M., ending thirteen hours of snow climbing in mid-June in one of the hottest and most arid sections of "The Great American Desert".

Next day, as my companion and I passed through Las Vegas, we took a last look at the snowy peaks of the Charlesons. They appeared blurred and unreal behind a curtain of quivering heat waves. We sighed and headed west out into the desert.

The temperature was 106 degrees.

Mars

(Continued from page 381)

Astronomers have high hopes that their renewed studies at the 1956 opposition may throw more light on the controversy.

The autumn equinox, marking the beginning of fall, will take place on September 22, at 8:36 P.M., Eastern Standard Time.

The New Moon will occur on August 6 and September 4, and the moon will be full on August 21 and September 20.

Mercury will be an evening star until September 26 and will enter the morning sky on that date. It will set in twilight, about an hour after the sun on August 15, reaching its greatest elongation on August 31. It will be poorly placed for observation.

Venus will be a morning star in August and September. It will rise three and one-half hours before the

sun on August 15, and will continue to do so for the rest of August and all of September.

Do not fail to look at Mars on or about September 7. It will not look that big again until 1971. It will rise around sunset and will remain visible, in Aquarius, for most of the night.

Jupiter, in Leo, will be too close to the sun to be seen in most places. It will set half an hour after the sun on August 15, being fairly lost in the evening twilight. By the end of September it will rise one hour and one-half before the sun and may be seen just above the horizon.

Saturn, in Libra, will be seen in the early evening, setting at about 10:30 P.M. on August 15, and 9 P.M. on September 15.

The Perseid meteor shower from July 30 to August 17, with maximum on August 12, will be very favorable this year. It will be seen mostly after midnight. The maximum rate may reach 50 per hour. These meteors are generally bright and spectacular. ♪ ♪ ♪

Lots of Termites

For more than 46 years Dr. Thomas E. Snyder, retired Department of Agriculture entomologist, has been gathering probably the second most valuable collection of termites in the world. This collection of 230,000 specimens, including 1286 distinct species of the approximately 2000 known in the world, has been presented to the Smithsonian Institution by the U.S. Department of Agriculture Forest Insect Research. Dr. Snyder says that there are probably many kinds that still have not been collected and thus still remain unknown—except to another termite.

Swan Fraternization

Fraternization between members of the flocks of trumpeter swans in Canada and those in the United States has long been suspected but until now no positive proof has been available. During the past winter a dead swan was found at Island Park, Idaho, bearing a leg band indicating that it had been banded near Grande Prairie, Alberta, some 850 miles north of where it was found. Also three cygnets with yellow plastic leg bands, identifying them as of Canadian origin, were also observed. It is also believed that competition for nesting territory—one family requiring about one square mile of territory—has caused some United States birds to migrate to Canada.

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Nature AND THE MICROSCOPE

By JULIAN D. CORRINGTON

Scouring Rushes

WAY BACK IN GEOLOGICAL HISTORY, at a time when fishes were the dominant animals on earth, members of the plant kingdom succeeded in establishing beachheads on Silurian shores and had built the first forests by the Devonian Period, some 350,000,000 years ago. Prominent among inhabitants of these forests were giant horsetails and club-mosses or lycopods, and their fossil remains formed extensive deposits of coal in the succeeding Carboniferous Period. Today these once mighty and dominant plants are represented by a handful of insignificant survivors—four genera of lycopods and only a single one of horsetails, *Equisetum*, with some twenty-five to thirty species.

Even as a genus *Equisetum* (horse-bristle) goes all the way back to the Carboniferous, making it one of the oldest on earth, sole incumbent of the Family Equisetaceae and the Order Equisetales; indeed, even of the Class Equisetinae of some authors. Since all of its near relatives have perished it is truly a "living fossil," just as is the horseshoe crab among animals. The few species occur throughout the world except in Australia, and grow in a variety of situations, from swamps and bogs to sandy wastes, and even in such dry and forbidding sites as the ballast along railroad tracks. The dominant plant is the sporophyte generation but, like their relatives the ferns, there is a still prominent although reduced gametophyte. Most horsetails are under three feet in height, although there is one in South America that attains an elevation of thirty to forty feet by leaning upon the trunks of other plants in vine-like fashion.

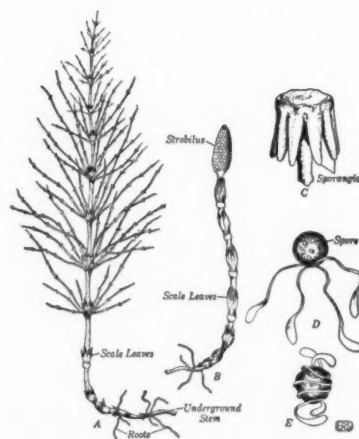
As shown in our illustration, horsetails have an underground stem running horizontally, the *rhizome*, divided by *nodes* into a series of short sections, the *internodes*. At the nodes are whorls of scale-like leaves as well as roots, and it is here also that branches arise and, turning to the

vertical, become the erect shoots of the plant visible above ground. In some species there are two kinds of these branches, commonly referred to as stems, the sterile and the fertile. Sterile stems are green and, at their nodes, provided with whorls of secondary branches, and these may in turn have still others. At each node is a circlet of small scales, the leaves. It is the brush-like appearance of this sterile plant that gave rise to the name horsetail. The epidermis of the stems contains silica, making the texture coarse, a fact discovered by housewives in many a pioneer society, using these plants in cleaning pots and other utensils—hence they are commonly known as the scouring rushes.

Stems become hollow

The stems are ribbed and furrowed, with stomates in the furrows. These stems are filled with a central pith at first but become hollow as they mature, the pith disappearing. Photosynthesis is carried on by the stems in the absence of any broad foliage leaves.

Even more interesting are the fertile stems, which eschew photosynthesis in favor of reproduction, and are yellowish and unbranched in *E. arvense*, one of the best-known species. The rhizomes are perennial; the stems either perennial or annual. If the latter, then the fertile stems are usually the first to appear above ground in the spring. Each terminates in a conspicuous *strobilus* or cone, outwardly made up of small hexagonal shields attached by stalks to a central shaft. In the photomicrograph of a vertical section of this cone it is seen that the shields turn upward at more or less of a right angle to their stalks, and protect a case of spores. Each unit—shield, stalk, spore-case—is a *sporangiophore* (spore-case bearer); each spore-case is a *sporangium*, and their number per unit varies. Within each sporangium one sees at first a large number of spore mother cells. As they mature, these divide twice to make four spores per mother cell, and it is here



Equisetum arvense. A, rhizome and sterile aerial branch of sporophyte. B, fertile branch bearing a cone. C, sporangiophore, dissected free, bearing sporangia. D, E, mature spores with elaters uncoiled (D) and coiled (E). From Smith, Gilbert, Evans, Duggar, Bryan, and Allen, *A Textbook of General Botany*, by permission of The Macmillan Company.

that the reduction of chromosomes takes place, the final spores being monoploid. Spore cases slit longitudinally to release the mature spores.

These horsetail spores, of which we gave a separate account in the May, 1942, issue, are provided with four *elaters*, shown but not labeled in the drawing. These are strap-like filaments ending in club-shaped enlargements. The spores may be dissected out under low magnification and placed on a clean blank slide for examination, mounted dry under a cover glass. If a drop of water is now added at one edge of the cover, the spores perform most amusing antics, twisting, turning, kinking, and coiling, for they are markedly hygroscopic—very sensitive to changes in moisture. The elaters straighten out when dry, coil spirally around the spore when wet, an adaptation to hurl them to a distance from the parent plant. Dry spores may be kept indefinitely in a vial or envelope and this performance can be repeated as often as desired.

The plain little cones of *Equisetum* may be regarded by the uninitiated as an uninspiring subject, but should actually be viewed with proper awe, for here are the world's first flowers! This is technically speaking, of course, for horsetails and their allies, the ferns and club-mosses, belong to the flowerless plants descriptively; but the strobilus is the beginning of



Vertical section of mature strobilus of *Equisetum*, 24X. From slide loaned by Ward's Natural Science Establishment, Inc.

an evolutionary series that led eventually to such elaborate and gorgeous developments as the orchid and the rose.

Thumbnail Reviews

KINSHIPS OF ANIMALS AND MAN. By Ann H. Morgan. Mount Holyoke College. Pp. viii, 839; pls. II, figs. 592. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 1955. \$6.75.

Skilfully organized, modern in presentation, by well-known, expert teacher. Introduction on matter, energy, strikes right balance, does not attempt to teach a course in chemistry. Chapter on plants a necessary precursor to animal nutrition. Physiology on an ecological basis, followed by development, heredity. Thorough survey of animal kingdom, ending in evolution per se, although all chapters use evolution as key to explanations. Appendix on classification; especially fine, carefully selected, annotated list of references. Illustrations remarkably well chosen, many original, tied in with subject matter to high degree. Highly recommended; includes latest findings; examples, use of tracer substances in elucidating physiological processes, insects guided by polarized light, cortisones in treating arthritis, carotenoid pigments in vision.

THE VERTEBRATE BODY. By Alfred Sherwood Romer, Harvard, 2nd ed., pp. viii, 644; figs. 390. W. B. Saunders Co., W. Washington Sq., Philadelphia 5. 1955. \$7.00.

Lengthy, detailed account by well-known author, teacher. Incorporates changes in skeletal system, new figures on skull, shortening section on limb muscles, general polishing, adding new concepts. One of best texts for year course, especially for advanced work in vertebrate morphology, reference. Too long and detailed for one-semester premedical course, with too much paleontology, histology, embryology. Many illustrations very good; many too small, crowded, labels in too small a type. Text type poor choice, trying on eyes, discourages perusal of any length.

A SHORTER VERSION OF THE SECOND EDITION OF THE VERTEBRATE BODY. By Alfred Sherwood Romer. Pp. viii, 486; figs. 390. W. B. Saunders Co., W. Washington Sq., Philadelphia 5. 1956. \$5.50.

Much better than preceding for one-semester course. Material rewritten, while condensing, with aim of retaining everything of main value yet omitting details of lesser importance. All illustrations of larger book are used. Our same objections to type face and certain illustrations apply here, too.

IRRIGATED SOILS, Their Fertility and Management. By D. W. Thorne & H. B. Peterson, Utah State Agricultural College. Pp. xii, 392; figs. 78. Blakiston Division, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 1954. \$6.50.

Second edition of successful work on agronomy. Any reader unfamiliar with tremendous impact of science in area of soil management will be truly amazed by revelations found in this book. Aimed especially at needs of arid and subhumid zones of world, as western U. S., has much of importance for modern farming everywhere. Relations of soil to water, salts, plants, microorganisms, drainage, fertilizers, other factors, fully discussed; also reclamation of substandard soils, irrigating, fertilizing, farm planning, management for special crops. A must for the scientific farmer, agronomy teacher.

INTRODUCTION TO EVOLUTION. By Paul Amos Moody, University of Vermont. Pp. xii, 475; figs. 153. Harper & Brothers, 49 E. 33rd St., New York 16. 1953. \$6.00.

Excellent organized and written book, well designed and carefully executed illustrations. Preview on history and philosophy of evolution; chapter on adaptation, how animals change; then bulk of volume on proofs; one chapter each on structure, embryology, metabolism, serology, classification, two on geographic distribution, five on paleontology. Chapter 14, means and methods of evolutionary change; three on principles, with genetics, natural selection, other factors; final chapter entitled, "What of it? An open letter to students," which is a personal and frank discussion of relationships of science in general, evolution in particular, to religion, ending with remarks on social evolution and future of mankind. Thorough, interesting, authoritative, stimulating.

GENERAL BOTANY. William T. Taylor & Richard J. Weber, Georgetown University. Pp. vii, 376; frontisp., figs. 134, tables 14. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. 1956. \$5.75.

Excellent brief work for one-semester course. Refreshingly different approach. All new, original illustrations by Wilma Riley. Morphology and physiology in first half, taxonomy in second, terminal chapters on genetics, evolution. Metabolism especially well covered; mitosis, meiosis look quite different in modern dress; algae, fungi carefully explored. Where suitable, illustrations are stereoscopic, using phantom interiors; many of these very effective; we liked particularly the fine and numerous life history charts. Authors' obvious aim—praiseworthy to us—is brevity; resulting style sometimes cramped, monotonous; fact crammed upon fact; but material is there, up-to-date, competent.

VERTEBRATE DISSECTION. By Warren F. Walker, Oberlin College. Pp. ix, 331; figs. 62. W. B. Saunders Co., W. Washington Sq., Philadelphia 5. 1954. \$3.50.

New lab. manual, full directions for dissection, study, by systematic method. Under each system of or-

gans, specimens classed as fishes, primitive tetrapods, mammals. Lower chordates, featuring microslides of amphioxus; lamprey; evolution, external anatomy of vertebrates by class. Eight chapters on the systems; appendices on terminology, preparation, references. Illustrations used sparingly, where needed to em-

phasize points; highly useful tables on skull bones, major muscles, pelvic muscles, cranial and occipital nerves of fishes, segmentation of cranial nerves, branchial vessels. Features distinctive types; reading matter roman, structures in italics, dissection instructions bold face, names in capitals.

Minute Biographs

THE PRESENT year marks the three-hundredth anniversary of the birth of Edmund Halley, discoverer of periodicity in comets. Some of these heavenly bodies visit the solar system but once, having orbits that describe a parabola or hyperbola; but others move in an enormous ellipse, very close to the sun at one vertex, a vast distance away at the other. Halley discovered one that had startled earth's inhabitants in 1531 and again in 1607 and 1682, and predicted its reappearance in 1759. When this came true the comet received his name and became that one best known to the general public. It has reappeared in 1835 and again in 1910, when comet parties became the social craze of the year.

Halley attained to the position of captain in the British navy, then was appointed professor of geometry at Oxford, and finally astronomer royal until his death in 1742. He contributed many important findings in mathematics, physics, and astronomy.

SONGS FOR BIOLOGY

AMY LOPSIN

"Davy Crockett"

Julia Salata, Secretary of IB Class, Santa Barbara High School, whose address is 94-19 120th St., Richmond Hill, N. Y., has sent us the following song as a contribution from members of the class:

Amy, amylopin, enzyme of the pancreas.

Sent out to work when she was only three—

Mashing up potatoes for they're so starchy;

She's a good little enzyme because she knows

She's got "go power" from Cheerios.

Amy, amylopin,—enzyme that knows no fear.

Now her work's important and is done with zest,

From the salivary glands to the large intest'

She's ahead of them all a'meetin' the test,

And helping digestion go on for the best;—

Amy, amylopin, enzyme that knows no fear!

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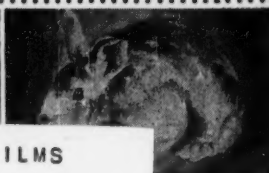


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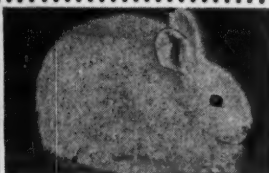


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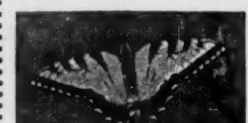
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